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THE CLINICAL APPLICATION OF THE RÖNTGEN RAYS.

So soon as it seemed probable that the Röntgen rays might prove of value to medical science THE AMERICAN JOURNAL OF THE MEDICAL SCIENCES, through its Editor, instituted experiments to ascertain methods and results in the clinical application of the discovery. The results of these experiments are given by the gentlemen conducting the various portions of this investigation.

I.

THE APPARATUS AND ITS USE.

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THE apparatus with which most of the work was done, which is described in this article, was essentially similar to that used by Röntgen in his original work. The Crookes' or vacuum tube was excited by a large inductorium or Ruhmkorff's coil, made by Apps, of London, and belonging to the Physical Collection of Princeton College. The coil is 14 inches long and 8 inches in diameter. When actuated by 6 or 8 cells, made by the Electric Storage Battery Company of Philadelphia, each having an electro-motive force of about 2 volts and a capacity of about 150 ampere-hours, the instrument ran steadily and gave a spark 6 inches long between points in air at each break of the primary current. A smaller inductorium, with a coil 9½ inches long and 6 inches in diameter, was also used successfully, but the larger coil seemed most

efficient, and was used in most of my work. It is probable that when the vacuum-tubes are improved the Röntgen action may be obtained by the use of much less expensive apparatus than that here employed. It is hardly necessary to statethat any voltaic cells or storage-batteries may be used as the source of current, and that care must be taken that no higher electro-motive force is present in the circuit containing the primary coil than that which the coil is designed to bear. This is generally not greater than 12 to 15 volts, and with smaller coils may be less. It is thus manifestly impossible to use the current from a city supply directly with the coil. If it is used at all, a shunt must be introduced. The best form of shunt is the proper number of cells of a storage-battery, which can be receiving their charge at the same time that they are setting the coil in action.

The vacuum-tubes used in my first trials were in the collection at Princeton; after they broke down others obtained from Queen & Co., Philadelphia, were found equally serviceable. My experience agrees with that of others, that the ordinary Crookes' tubes differ very much in their efficiency. Of those in the Princeton cabinet, only three or four, when tested by the *skiascope*, showed that they were furnishing an abundant supply of the Röntgen rays; and most of those on sale in the shops are worthless. The cause for the superior excellence of some tubes over others seems to lie largely in the different thickness of the glass wall. This has been stated by Mr. Edison, and an observation which I made suggested the same explanation to me.

One of the Crookes' tubes with which I worked had the form of a nearly spherical bulb with two conical projections. Four aluminum electrodes were inserted into this bulb, two at the ends of the conical projections, the other two, one a straight wire, the other a flat disk, through the wall of the bulb. Those who are familiar with the ordinary form of the Crookes' tubes will recognize this at once as the one furnished as a companion to another of similar form, but less highly exhausted, to show the difference between the Crookes' cathode-action and the ordinary stratified discharge. If the flat disk-electrode of this tube was made the cathode, a patch of green phosphorescence appeared on the opposite wall of the tube. This spot I made the source of the Röntgen rays in my first attempt to get a photograph; though sufficient was obtained to show the Röntgen effect, yet the action was very feeble; and when the tube in this condition is examined by the skiascope it is evident that the tube is not doing efficient work. Other tubes in which the cathode-rays travel long distances from flat electrodes before they fall on the glass show similar feeble action. When any one of the three wire electrodes was made the cathode the characteristic green phosphorescence appeared around it; in the case of the electrodes in the projections the phosphorescence was very brilliant and confined

almost entirely to the walls of the projection. Contrary to my expectation, I found that the tube, when these electrodes were cathodes, gave little or no evidence of the Röntgen rays. The only electrode which made an efficient cathode was the wire projecting into the bulb. When it was made the cathode all parts of the surface of the bulb became phosphorescent, with a yellowish-green light, and the skiascope showed a copious emission of the Röntgen rays. By placing in front of the bulb a plate of lead in which a hole about three centimetres in diameter was cut, the rays from all but a small part of the surface of the bulb could be cut off and the efficiency of different parts of the bulb tested with the skiascope. It became at once evident that the most efficient parts were the thin walls of the bulb, and that the places where the glass was thicker exhibited the action either less well or not at all.

If the Röntgen rays are excited, as Röntgen says, where the cathode-rays fall on the glass, and therefore start at the inner surface of the bulb, the known resistance of glass to the passage of the rays will easily explain this observation.

Another requisite for the production of the Röntgen rays seems to be a high vacuum in the tube. Some observers have made statements which contradict this, but my experience with the tubes in the Princeton cabinet, as well as with others that have been made for me, generally supports it. Some ordinary Geissler tubes, however, showed the Röntgen rays. They were such as had a narrow portion made of uranium glass. This portion seemed to be the source of the rays. I have used one of these tubes with the photographic plate with good results.

The photographic plates used were Hammer's Extra Fast, Carbutt's Eclipse, and plates specially prepared by Carbutt for the Röntgen rays. Most of the pictures of this article were taken on the Carbutt's Eclipse plates. One of them, No. 1, was taken on a freshly prepared Carbutt's special plate, with a material reduction in the time of exposure.

To take a picture or skiagraph by the Röntgen method the photographic plate is placed in an ordinary plate-holder, or shut up carefully in a cardboard box, such as those in which photographic plates are sold, with the sensitized surface turned toward the object to be taken. The plate in its holder is then placed in a convenient position, so that the object may rest upon the cover of the plate-holder, or at least be as near it as possible. The vacuum-tube is set up so that the most efficient part of its surface confronts the plate. I have found that in the case of objects like the bones of the hand or arm, which cannot rest directly on the cover of the plate-holder, increased distinctness of definition is obtained by using as a radiant surface only a small portion of the tube, shutting off the rest by means of the sheet of lead already mentioned. This greater definiteness of outline is gained at the expense of longer time required for the exposure and of less marked contrasts

of light and shade. For much work the whole tube may be used, and a fairly definite outline secured by setting the vacuum-tube at a greater distance from the photographic plate. When the radiant source was that portion of the tube which was exposed by the circular hole in the lead diaphragm, the vacuum-tube could be set about 6 or 8 inches from the plate, and a good picture taken of thin objects, like the hand, by an exposure of one hour. When the whole tube served as a source, an exposure of an hour for the thinner and an hour and a half for the thicker objects was sufficient, the tube standing 12 inches or more from the plate.

It should be noticed that the outline will be better and success more certain if those parts which are specially desired are brought as close to the plate as possible. The proper relative positions of object, plate, and tube may be readily seen by remembering that these pictures are shadow-pictures, and that if for the vacuum-tube we were to substitute an equally large globe of ground glass, illuminated from within, the object would cast a shadow on the plate very like that which it makes in the Röntgen rays. The arrangement which will cast the best defined shadows of the desired object will yield the best results.

The photographic plates are developed in the ordinary way. As the pictures are only shadows, and no artistic effect is required, the development can be pushed further than would be suitable with an ordinary plate, with the result sometimes of bringing out detail that does not appear at first.

The *skiascope*, to which reference has already been made, is an instrument designed to take advantage of the fact that the Röntgen rays cause fluorescence in certain substances, to make direct visual observations of these rays and the shadows cast by them. The fluorescent substance which I have used is the double cyanide of platinum and barium, which is so excellent for the observation of the ultra-violet rays of light, and whose usefulness in connection with the Röntgen rays was announced by their discoverer. Much of the salt which I have obtained from the chemists either exhibits no fluorescence at all with the Röntgen rays, or only a trace of it, and I cannot at present state the conditions of preparation which will insure good fluorescence.[1] The successful results which I obtained were secured with a piece of platino-bari-cyanide paper imported from Germany recently for the Princeton cabinet. A circular disk cut from this paper was fastened, with the fluorescent side inward, by non-actinic black photographer's paper in one end of a brass tube blackened on the inside. By fitting the other end of the tube around the eye, both the eye and the fluorescent sub-

[1] Dr. G. D. Rosengarten has investigated for us the chemical and physical properties of the platino-bari-cyanide.

stance are protected from the light. When this instrument is anywhere near the excited vacuum-tube, provided that the Röntgen rays can fall directly on the fluorescent paper, the fluorescent salt will glow, and the shadows of objects interposed between it and the vacuum-tube appear upon it. It is advantageous to bring the interposed objects as close to the paper as possible. The shadows thus cast have the same distinctions of intensity that they show by their action on the photographic plate. The outlines are generally not so distinct as they are on the plate. With a larger sheet of the fluorescent paper a larger instrument of the same sort can be constructed, which will enable the observer to use both eyes at once and to view a larger field.

This skiascope is very useful as a means of testing the behavior of the vacuum-tube. I have assumed that the vacuum-tube that affects the phosphorescent substance most vigorously will also act most vigorously on the photographic plate; all my experience is in harmony with this assumption, but I have as yet made no experiments to test it. Since slight changes in the performance of the inductorium will make considerable difference in the action of the vacuum-tube, it is convenient to have a test of proper action, such as can easily be made by this instrument.

This skiascope is obviously the instrument which is best adapted to the study of the physical questions connected with the Röntgen rays.

In describing this instrument as my own, I do not wish to be considered as asserting priority over Professor Salvioni, of Perugia, who has described an instrument essentially similar, but only independence in the invention.

In closing this account of the physical matters involved in our joint labors one or two isolated observations may be mentioned. In one case, when the photographic plate, which had been exposed to the Röntgen rays for over an hour, was taken from the plate-holder, the object—an arm and an elbow-joint—was seen by two photographers as a dark band across a light field. This seems to show that the sensitive film is phosphorescent and that the photographic effect is secondary. I have not as yet repeated this observation.

In the opinion of three observers the interposition of a thin plate of aluminum between the vacuum-tube and the fluorescent paper of the skiascope did not merely leave the fluorescence undiminished, but actually intensified it considerably. This effect was observed when the aluminum plate was first used. I tried to verify it later without success. I report it because the result was certain and because it may have some bearing on the success that has been obtained in rapid skiagraphy by those who have used aluminum covers for their plate-holders.

II.

IN SURGICAL DIAGNOSIS.

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The surgical cases that were examined by this method consisted of:

1. A burned hand (Plate I.) with anchylosis of all the fingers at the knuckle-joints and some necrosis of the metacarpal bones, which were in great part soldered together, the little finger being curved under the ring-finger. The skiagraph shows well the bones in the fingers. In the metacarpus, the reason for the fusing of nearly all the picture is that the bones, as a consequence of the very severe burn between the rollers of a heated mangle, were completely soldered together in one mass. It will be noticed that the little finger, even where it passes under the ring-finger, is well seen. Fig. 1 is an ordinary photograph of the same hand.

2. A tubercular elbow-joint (Plate II.) in a child of twelve years, in which it will be observed that not only the humerus shows, but also the radius and ulna. (Compare this with Plate III. of a stouter arm.)

3. The elbow-joint (Plate III.) of a young man of twenty years, who, twelve years ago fell, striking his olecranon violently on a bit of railroad iron, driving the ulna into tbe groove between the two condyles of the humerus and wedging them apart. The condyles, especially the inner, show well; the radius and ulna were in such contact as to appear only as one. Fig. 2 shows an ordinary photograph of the same elbow, though it by no means presents the extreme deformity as one sees it from various points of view. Strange to say, flexion and extension were excellent.

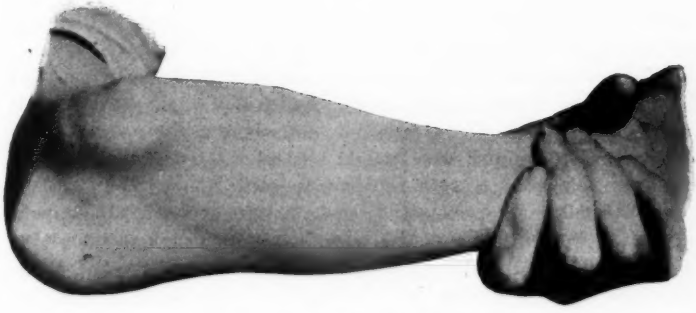
4. An elbow (Plate IV.) which had been resected for tubercular disease a few days before. This was in plaster-of-Paris splints encasing respectively the arm and the forearm, with a bar of iron extending between the two in order to fix the elbow rigidly. The skiagraph shows the plaster-of-Paris splint and the iron cross-bar. It is to be observed that the plaster is opaque to the rays, while on the contrary the gauze-dressing and the bandages which thickly encased the elbow and the bar were translucent to them. The ends of the resected bones of the forearm show only very faintly, and the end of the humerus also, probably (as the bar shows) from the movements of the child or some modification of the rays by the dressing and bandages.

5. A shoulder-joint with a recent resection of about three inches of the humerus, on account of an old dislocation with fracture of the surgical neck followed by a late osteomyelitis. This picture was also

FIG. 1.

Photograph of burned hand.

FIG. 2.



Photograph of fractured elbow.

taken without removing the bandage and dressing, by fastening the sensitized plate in its holder immediately behind the shoulder, while the Crookes' tube was placed in front of the shoulder, the patient lying sidewise in a bed. The skiagraph shows the outline of the edge of the scapula only; presumably the parts were too thick. Another difficulty was the constant respiratory movement, which has aided in blurring the outlines.

6. I attempted to skiagraph the trephine-opening in a case operated on four years ago, but, though the sensitized plate was left exposed for somewhat over an hour, no picture whatever appeared upon it. Whether this was due to a defect in the plate or in the tubes, or whether, as it seems to me more likely, to the impossibility at present to skiagraph through even one thickness of the skull, I do not know. The patient lay upon a bed with her head resting on a sensitized plate, the trephine-opening being next the plate and the Crookes' tube on the opposite side of the head. The head was not shaven.

7. Plate V. shows a hand of an uninjected cadaver. In it will be observed not only the bones and their cartilaginous extremities, but also in the thumb the sesamoid bones. A needle was thrust into the thumb up to its eye. This foreign and more opaque body comes out much more sharply than do the bones. Under the metacarpal bones of the fore and middle fingers are seen two large buckshot. These were inserted on the palmar surface of the hand, and are, therefore, seen through the bones. The skiagraph shows an enlargement of the head of the metacarpal bone of the thumb, which was found, by subsequent dissection, to be the result of an old injury. Plate VI. shows the wrist of the same hand, the carpal bones and the radius being fairly distinct. The metacarpals and the needle are much less distinct than in Plate V., and the buckshot show blurring at the edges. This is probably due partly to an accidental displacement of the hand, and the indistinctness of the metacarpals to their greater distance from the plate in Plate VI. than in Plate V.

We were anxious, also, at the ingenious suggestion of Mr. Arthur H. Lea, to see whether the hand of a dead person would act differently from the hand of a living person in intercepting the passage of the Röntgen rays, in order that it might be used as a test of death, but, so far as we can judge, no such difference appears.

8. The following specimens of bacteria were exposed to the rays in order to test their effect on the bacteria, namely: pink streptococcus, anthrax, micrococcus prodigiosus, micrococcus cereus flavus, sarcina aurantiaca, yellow sarcine, tubercle-bacillus, for first thirty minutes and then twice for fifteen minutes. In order to prevent the unfavorable effect of the glass tubes, they were so placed that the rays reached the bacteria through the cotton stopper. The tube of tubercle-bacilli was exposed

sidewise through the glass, and not lengthwise through the cotton, for one hour. Dr. Kyle reported that inoculations showed a good, strong growth from all of them. No lethal or even inhibitory effect was therefore seemingly produced upon these bacteria by an hour's exposure to the rays.

Clinical Conclusions. The above facts, together with other reports in various medical and lay journals, show clearly that the thinner portions of the body can be skiagraphed with considerable accuracy. This is true of parts of the body as thick as an ordinary elbow. Whether it will be true of the thicker parts of the body, *e. g.*, shoulder and trunk, is doubtful with present methods.

The effect of doubling the thickness through which the rays pass is admirably shown in the skiagraph of a foot in the *British Medical Journal*, February 8, 1896. Where two toes overlapped the skiagraph is twice as dark as where it was taken through a single toe.

One of the difficulties we have had has been the length of time necessary to take the pictures. The shortest exposure in any of these has been twenty minutes with extra quick plates made specially for us by Mr. Carbutt. We observe in the newspapers that it has been stated that instantaneous pictures have been lately taken by Edison and others. If this be so, it will aid materially in getting better-defined pictures both by relieving the patient of the irksomeness and even impossibility of remaining absolutely still for so long a time, as in the old daguerrotype, and by obviating the blurring consequent upon respiratory movements of the chest and the abdomen. The skiagraph of five years hence will be as superior to such as we present herewith as our present photographs are superior to those of forty years ago.

To sum up the clinical results obtained by ourselves and others, it is evident that of the *normal structures of the body* it would seem that all are permeable to the rays except the bones, and, therefore, it is not very probable, at least with our present methods, that we can determine much about them, although in the *British Medical Journal*, February 8, 1896, Mr. Sidney Rowland states that Adolph and Lenz, of Elberfeld, have been able to get pictures of *connective tissue*.

The *bones* are opaque to the rays, hence deformities, injuries, and diseases of bone will be more or less amenable to diagnosis by this method. The best illustration of this that we have seen is the case reported and figured in the *British Medical Journal*, already alluded to. In this case the distal phalanx of the great toe appeared to be double, as though there were two bones in the last joint. There was difficulty in distinguishing which of the two bones was the normal phalanx and which the supernumerary. Prof. Mosetig, therefore, took a skiagraph and was able instantly to determine which was the normal and which the abnormal phalanx.

We shall probably be able to differentiate *fracture* and *dislocation* even possibly in the thicker parts of the body when our methods have become more perfect. As has been pointed out in *The Medical News* of February 22, 1896, this may be of much use in obscure cases with great swelling, for the swelling is not impermeable to the rays. Suspected greenstick fractures can be made evident, and in any case in which possibly a claim for malpractice would be made, if, after the bones are adjusted, they were skiagraphed through the dressings, including even the ordinary board splints (plaster, of course, would not do), such a skiagraph might be of great value in court. Even if not needed for such medico-legal purposes, it would be of value to the surgeon in assuring him that everything is in proper order. *Exostoses and bony tumors* of any kind can thus undoubtedly be diagnosticated. *Cartilage* is translucent to the rays.

Gall-stones have been skiagraphed outside of the body (but not yet in the living body) by Neusser, Goodspeed, and Cattell (*The Medical News*, February 15, 1896, p. 169), but although only obscured by the thickness of the wall of the bowel into which the gall-stone had been thrust, no diagnosis could have been made from it. If we did not know a gall-stone was there, we could not have guessed it.

Phosphatic and probably other *urinary calculi* Neusser has shown to be quite impenetrable to Röntgen rays (as would be suspected by the impermeability of plaster-of-Paris in Plate IV.), but it is very doubtful whether we will be able to utilize them in diagnosis, on account of the bladder lying in the pelvic basin, the bones of which would cut off the rays. The kidneys at present cannot be skiagraphed, as the rays will not pass through so thick a part of the body. *Renal calculi* are as yet beyond our diagnosis by this method.

It is very doubtful also whether our diagnosis of *tumors* will be much aided by this new method, excepting in cases of bony tumors. Other tumors seem to be as translucent to the rays as the soft parts of the body. In tumors of the brain, the bones of the head (especially as the rays would have to penetrate *two* thicknesses of bone) will absolutely preclude any use of this method in diagnosis.

All such statements as the above apply, of course, only to our present knowledge. It is not only possible, but very probable, that we shall be able to accomplish very much more by the improvements which will be introduced into the method within the next few years.

Probably the most important use of the method will be in the location of *foreign bodies*. While some metals are translucent to the rays, others, and fortunately the common foreign bodies, are not translucent: thus in Plate V., of a dead hand, a *needle* thrust into the soft parts of the thumb shows with such striking clearness that we may positively say that, if a needle is suspected to exist in *any* part of the hand (and very

often the history is obscure, so that we are doubtful whether the needle is really in the hand or not), by means of the Röntgen rays we can positively determine its existence and location.

The same skiagraph shows two *buckshot* which were placed purposely in the palm of the dead hand, and they are clearly seen even through the metacarpal bones. This method has actually been utilized already in several instances, according to the daily papers. Once by von Bergmann, in Berlin, Bury, of Chicago, and several others who have been able to find bullets and shot believed to be imbedded for a long while in the body. It is almost needless to add, as von Bergmann has pointed out, that most of such missiles, if they are quiescent, would be best utilized as phenomena than removed.

Fortunately, also, *glass* is very opaque to the rays, and if the hand is cut by glass, the existence of any pieces which might otherwise be overlooked can be disclosed by the Röntgen rays. One peculiar advantage of the method also is this: A hand supposed still to have a fragment of glass in it can be skiagraphed without removing the dressings even though they be moderately thick, as both gauze and bandages are permeable to the Röntgen rays. Thus Plate IV., of an elbow, was taken while covered with the ordinary voluminous surgical dressings.

The hand from which Plate VII. was taken is that of a patient, a young colored woman, who had suffered amputation of the third finger some months previously. There remains a very sensitive condition of the stump, and at one point a small area exquisitely painful to pressure. The skiagraph was undertaken to determine the condition of the end of the bone, to ascertain whether an enlarged nerve-end would give a shadow to the rays, and to secure any information leading to a choice of operative procedures for relief. The patient was brought for examination by Dr. Stricker Coles, to whom she had come for treatment. An examination of the end of the finger will show upon its ulnar aspect a slight enlargement of the tissues next the bone. No distinct enlargement of the nerve is visible by this method of inspection. This skiagraph was taken with an exposure of one hour without the use of the lead diaphragm and with the Crookes' tube a distance about fifteen inches from the hand. The plate is interesting for its clear delineation of the wrist. In view of the fact that no one point at the end of the stump could be demonstrated to be in a pathological condition capable of cure by operation, the patient was advised to submit to amputation of the metacarpal bone.

FIG. 3.

Pelvis and fœtal skull.

III.

THE STUDY OF THE INFANT'S BODY AND OF THE PREGNANT WOMB BY THE RÖNTGEN RAYS.

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The body of the infant and pregnant womb present conditions alike favorable and unfavorable for investigation by this method. The body of the infant contains a skeleton so much less completely ossified than that of the adult that it is scarcely to be expected that the same clear shadows can be obtained with the apparatus at present at our command. The problem naturally presents itself, Can the skeleton of the fœtus be recognized by this method within the mother's womb? To ascertain the relative density of the pelvis and fœtal skull to the rays, the following experiments were undertaken:

The skull of an infant at term was placed in a female bony pelvis upon a sensitized plate completely sealed in a pasteboard box. The pelvis was placed in such a position that it rested upon the plate upon the tuberosities of the ischia and the coccyx. The skull was laid obliquely in the pelvis. To secure as much definition as possible a lead diaphragm was interposed between the tube and the pelvis. An exposure of one and one-half hours was made to test thoroughly the various portions of the skull and pelvis subjected to the rays. The result is appended in Fig. 3. Reference to this illustration shows the fact that the greater portion of the fœtal skull gives but a very faint shadow under the action of these rays. The base of the skull is darker, while the temporal region scarcely gives a reaction. In marked contrast to this is seen the black coccyx, which rested upon the plate, and also the rami of the pubes and the spines of the ischia.

A further test was made of the permeability of the fœtal skull by placing the skull upon its parietal surface upon a sensitized plate, and by dropping into it two buckshot, which rested upon the lower parietal bone. In order to reproduce these shot the rays traversed both sides of the fœtal skull. An exposure of one hour was made, with the use of the lead diaphragm. The accompanying illustration (Fig. 4) shows again the transparency of the temporal portion of the skull, and the fact that the lead bullets are clearly seen through the skull. It was next determined to investigate the action of the rays upon the bones of the fœtal skeleton. To ascertain this the skiascope of Magie was employed with direct inspection. In a darkened room, and with the head of the observer covered by a camera-cloth, the foot of an infant three days old, born at term, was held against the skiascope, exposed to the rays of the tube.

FIG. 4.

Fœtal skull containing buckshot.

PLATE I.

Hand with anchylosis of all fingers and deformity of little finger from a burn on the dorsum of the hand. Exposure twenty minutes. Carbutt extra sensitive plate.

PLATE II.

Tubercular disease of elbow-joint. Exposure one hour and twenty minutes.

PLATE III.

Intercondyloid fracture of humerus. Exposure one hour and thirteen minutes.

PLATE IV.

Resection of elbow. Plaster-dressing to arm and forearm, with iron cross-bar between. Skiagraphed through the dressing and bandage. Exposure one hour and ten minutes.

PLATE V.

Hand and wrist of an uninjected cadaver, into palmar aspect of which a needle and two buckshot were thrust.

PLATE VI.

The same hand as Plate V., to show the bones of the wrist and forearm.

PLATE VII.

Hand with painful stump of phalanx.

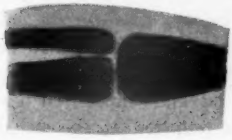
PLATE VIII.

Skiagraph of infant's body.

FIG. 5.

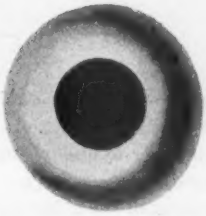
Sketch of living infant's foot, from skiascope.

FIG. 6.



Sketch of living infant's knee, from skiascope

FIG. 7.



Sketch of orbital plate and eye, living infant's head, from skiascope.

The bones of the tarsus and metatarsus and the outline of the foot were readily seen by three observers. One of these, Mr. W. H. Alcott, an artist in attendance, immediately made a sketch of what he saw. The accompanying illustration is a reproduction of his sketch. (Fig. 5.) The knee of the same child was next investigated in the same manner, and a sketch made of what was seen. Here it will be observed that the cartilaginous portions of the joint offer no shadow by the passage of the rays. (Fig. 6.)

The skull of the infant was next turned, with its temporal region toward the tube, and an effort made to appreciate the passage of the rays through the skull by direct inspection with the skiascope. Here again the temporal region and the brain gave no shadow upon inspection. Upon moving the instrument toward the orbital plate the outline of the border of the orbit and the eyeball appeared, as shown in the accompanying illustration. (Fig. 7.) This led to the question as to the permeability of the eye to these rays. Dr. G. E. de Schweinitz very kindly subjected a pig's eye to direct inspection with the skiascope, and found that the eye does not cast so deep a shadow as do the adult bones, but that the eyeball does not transmit the rays as do the soft portions of the body. The eye was inspected in its longitudinal axis, and also transversely. When the rays pass longitudinally the eye seemed more permeable than when the rays traverse the sclerotic. To test further this question, Dr. de Schweinitz sent me two bullock's eyes, of which a skiagraph was taken by direct exposure to the rays for half an hour. A considerable mass of fat and connective tissue was adherent to the eyes, as they had been removed at the slaughter-house and had not been dissected. It will be observed that this fatty tissue is much more permeable than is the eyeball. In one of these the rays passed through the eye transversely and in the other longitudinally. (Fig. 8.)

The direct inspection of the trunk of the fœtus with the skiascope revealed the fact that the rays permeate the trunk of the newborn child with facility, but that the skeleton casts but a faint shadow. It was possible to appreciate by direct inspection the passage of the rays through the body of a child weighing five and a half pounds, three days old, and born in the ninth month of gestation. The infant was held with its back toward the tube, while the skiascope was applied directly to the chest. The infant's body was not exposed, but remained covered by two thicknesses of light flannel. It was impossible, however, to outline the skeleton clearly or to observe movement in the internal organs.

An investigation of the trunk of the infant by passing the rays directly through the body of the child to a sensitized plate resulted in a very interesting demonstration; the child was clothed in two flannel garments, making four thicknesses which the rays permeated. The umbilical cord

FIG. 8.

Skiagraph of bullock's eyes.

had not separated, and at the umbilicus there was a considerable area of granulating tissue with a slight extravasation of blood, occasioned by pulling upon the cord when the belly-band was taken off for the inspection of the child. The stump of cord remained wrapped in its dressing of aseptic cotton. The child was bandaged upon a sensitized plate, with its back toward the plate, very much as the Indian papoose is fastened to its board. The bandage was the ordinary surgical roller, and entirely covered the trunk of the child's body. It was then exposed to the direct action of the rays, the tube being ten inches from the body, for forty-five minutes. The child remained quiet, did not seem annoyed by the crackling of the tube, and experienced no apparent discomfort. (Plate VIII.) Reference to the accompanying illustration shows the faint outline of the ribs, a dark shadow given by the sternum and underlying spinal column, a trace of the vertebral column, dark shadows cast by the crests of the ilia upon each side, and a shadow given by the stump of umbilical cord, which lay obliquely across the body toward the right, and by the granulating tissue at the umbilicus. The shorter exposure was made in this case from the belief that in very permeable objects too great an exposure may result in losing an outline which could otherwise be obtained.

The attempt to secure a skiagraph of the fœtus *in utero* was naturally attended with great difficulty. The usual timidity of pregnant women, the difficulty which a pregnant patient experiences in sitting or lying in a fixed position, the thickness of the tissue to be permeated, the respiratory movements of the mother, and the fœtal movements, necessarily complicated the experiment. A previous attempt had been made to secure an outline of the spinal column in an adult man, with an exposure of two hours. A newly invented sensitized plate was used for this experiment, with a negative result. A similar plate was employed in the case of a girl, aged eighteen years, pregnant eight and a half months, her fœtus occupying the usual position in the womb. She was placed in a comfortable position upon a clinical table, the abdomen covered with a sheet, and the patient attended by a nurse. A sensitized plate recently devised by Carbutt was placed against the abdomen upon the patient's left side. The lead diaphragm was interposed between the Crookes' tube and the right side of the patient's body, and any danger of the transmission of shock to the patient was obviated by connecting the diaphragm with a gas-fixture. The tube was placed vertically, and the patient subjected to the action of the rays for one hour. The plate was uniformly acted upon by the rays, but without definition.

A second attempt was made with the same patient, using the Eclipse plates, which we have found most successful, without the use of the lead diaphragm, and with an exposure of one hour and fifteen minutes. It was interesting to observe on both occasions that the proximity of the

electric apparatus seemed to have no perturbing effect upon the patient. She was informed that an effort would be made to ascertain the position of the child by the use of the electric light; she readily consented to the attempt, and, aside from slight fatigue from remaining quiet in one position, she seemed rather to be soothed by the constant sound of the apparatus, her pulse not varying through the entire time. The result of this second effort to investigate the pregnant uterus shows a difference in the permeability of the fœtal body and limbs from that of the uterine wall and amniotic liquid. By reference to the negative it was seen that the faint outline of the trunk of the fœtus could be recognized, the darker shadow of its pelvis occupying the upper right-hand portion of the plate, while projecting downward at about the centre were irregular white masses showing the situation of the fœtal limbs. The head of the child was so hidden by the mother's pelvis that no definite indication of its presence was obtained. While this experiment failed to outline distinctly the skeleton of the fœtus, it offers information which may be of value in further attempts. There has not been the slightest evidence that the passage of the rays through the uterus has affected either mother or child.

From our study of the pelvis and skull, and from our investigation of the living patient, it seems probable that information of practical value regarding the position and attitude of the fœtus may be obtained with the future development of this method. It seems probable that the contour of contracted pelves may also be recognized in future. An abnormal condition of the fœtus, such as a tumor, or an accumulation of fluid within a cavity of the fœtal body, might be recognized by the abnormal contour of the tissues. The presence of more than one fœtus in the uterus could possibly be appreciated. That a distinct outline of the individual parts of the fœtal skeleton is to be obtained seems scarcely probable with our present knowledge and the apparatus at present at our disposal. The attempt to obtain information by this method is certainly a justifiable one, as it requires no exposure of the patient, no vaginal manipulation, and puts her to no essential discomfort.

In concluding our account of these studies there are some general observations which may prove of value to clinicians in adopting this method. From Magie's description of the apparatus, it is evident that a well-equipped hospital, lighted by electricity, can readily add to its resources a clinic-room for this investigation. The ten patients whom we examined experienced no discomfort during the application of this process. Where the hand is to be examined, the patient is most readily accommodated in a comfortable chair, with the hand resting upon a table. Where a child's limb is to be investigated, it is best to lay the child upon a comfortable table, and to bandage the sensitized plate upon the limb. We find that surgical dressings, cotton, and the ordinary

bandage interpose no essential obstacle to the passage of the rays. The four children subjected to examination by this method gave us no trouble by restlessness, and, after the first crackling noise of the apparatus became familiar, were not in the least disturbed. This method can be readily applied to bedridden patients. It would be necessary to secure a proper holder for the Crookes' tube, so jointed that the tube can be raised or lowered and extended over the body. The patient could be brought to the examining-room in his bed, the sensitized plate bandaged upon the portion of his body to be examined, and the tube suitably adjusted. The services of a practical electrician and of an expert photographer are necessary for the application of this method.[1] The electric current can be obtained from the Edison Lighting Company, and an additional apparatus could be supplied by the hospital. As dry plates are used, the photographer's apparatus need not be elaborate. A small dark-room adjacent to the clinic-room would be required, with running water.

By the use of the skiascope, at the present stage of our knowledge, the fingers and hands are open to limited investigation. During these studies we had occasion repeatedly to examine the bones in our fingers, and to recognize the metacarpal bones. It was also possible to observe the rays coming between the radius and ulna by looking directly through the arm, and to observe the penetration of the rays behind the trachea by placing the skiascope just behind the larynx. A more extended application of this method depends upon chemical and physical research as outlined by Magie.

It is evident, however, that at present we may obtain by this method valuable information regarding the terminal portions of the skeleton, and regarding the contour of various portions of the body. The presence of metallic substances in the body may be demonstrated. It remains for physical laboratories to furnish the clinician with improved apparatus for the further application of this method of clinical research. It remains for the physiologist to supply us with indices to the permeability of the various normal tissues of the body, and for the pathologist to furnish us similar information regarding the effect of the rays upon diseased tissues. So far as our observation goes, bacteria exposed to the action of the rays are not influenced by them.

[1] We desire to express our obligation to Walker & Kepler, electricians, and especially to Messrs. George Teffeau and Redmond, for their kind and efficient assistance in this investigation. We are also greatly indebted to Mr. F. E. Manning and to Mr. John F. Reese, photographer, for constant and intelligent work with us.

TUBERCULOSIS OF THE FALLOPIAN TUBES.

(SECOND PAPER.)

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IN a preliminary paper (AMERICAN JOURNAL OF THE MEDICAL SCIENCES, November, 1894) we reported five cases of tuberculosis of the Fallopian tubes which we had found in a series of twenty-five cœliotomies for inflammatory disease of the uterine appendages. Since then we have continued our observations in this direction and have made most careful studies of all cases of pelvic inflammatory disease upon which we have operated. This second series of cases numbers twenty-seven. In this series we have found four cases of tuberculosis of the tubes—14.8 per cent.

CASE VI.—Admitted to Gynecean Hospital. E. K., American, white, aged forty years, widow, housewife, multipara; Para III., miscarriage thirteen years ago (three months). In first confinement it was necessary to perform podalic version; others were normal. In puerperium following birth of last child she had high fever for ten days and was confined to bed for four weeks. Eldest child is nineteen years of age and youngest fifteen years. Menstruation first appeared in her thirteenth year, and was always regular, lasting four to five days, but was very painful until ten years ago. The pain began one or two days preceding the flow, and continued, but much less severe, throughout the period. Ten years ago menstruation became irregular, occurring every two or three weeks and occasionally lasting two weeks, but as a rule three or four days. It continued irregular until menopause, four years later. The patient at time of birth of last child was perfectly healthy, weighing 180 pounds Since this time she has gradually lost in flesh and strength, particularly during the last year, until she now weighs 110 pounds She has had leucorrhœa since birth of last child, but it did not become profuse until December, 1894; since then the discharge has slowly increased. Eight years ago she began to have pain, coming on without any apparent cause, in right iliac fossa. This pain has slowly increased until now she complains of sharp and shooting pains in both iliac fossæ, particularly the right, the hypogastric region, and the lumbar region, extending down both thighs to the knee when she makes a misstep and with any degree of exertion; micturition is frequent and painful. The bowels are regular. Appetite good. Has had dyspepsia during last eight months. Headache—frontal and parietal. Urine normal. She had the usual diseases of childhood, but except for present trouble has been perfectly healthy. She has never had any pulmonary or joint disease which might suggest tuberculosis. Father died of cause unknown to patient; mother of apoplexy. An aunt died of phthisis; one sister now has phthisis. Four brothers and one sister are healthy.

Husband died of phthisis pulmonalis eleven years ago. Eldest child is delicate, others are perfectly healthy.

Vaginal examination. Uterus normal in size, shape, and position. Tubes somewhat enlarged and indurated.

The strips of endometrium removed by curette were noticed to be very thin, pale, and much harder in consistence than normal. They were hardened in alcohol, mounted in celluloidin, and subjected to microscopical examination, as is our custom with all tissue removed at operation. Microscopically the endometrial tissue is found almost entirely destroyed and replaced by a mass of typical miliary tubercles. No traces of glandular tissue can be found in any part of any section of the corporeal endometrium, and only at long intervals can the normal stroma-cells be seen. The miliary tubercles are pale circular areas composed of epithelioid cells, taking the stain exceptionally poorly, and in the centre are very frequently one or two large giant-cells. These tubercles are separated from each other by a very extensive small round-cell infiltration, a small amount of remaining stroma-tissue. No small round-cells are seen within the miliary tubercle itself. The diagnosis of chronic fibroid tubercular endometritis was made positive from this examination and abdominal hysterectomy determined upon.

Cœliotomy. November 27, 1894. The tubes and ovaries and the uterus were removed at the vaginal junction.

Microscopical examination of specimen. The specimen consisted of a uterus, complete, and the tubes and ovaries from both sides.

Right side: The right tube was 7.5 cm. in length, 0.4 and 0.5 cm. in diameter in its proximal third, 0.6 and 0.7 cm. in its middle third, and 0.8 and 0.1 cm. in its distal third. The proximal third is regular and normal in size, but is very hard in consistency, feeling like a cord. At the junction of the proximal and middle thirds the tube abruptly enlarges, forming a nodule of the same consistency which extends for a distance of 0.1 cm. Beyond this, for 0.2 cm., the tube again becomes of normal size and is much softer. Then, again, there is a nodule 1.5 cm. in length, 0.1 cm. in diameter, having the same characteristics as the other nodule. This last nodule closes the tube-lumen and leaves the fimbriæ, which are few in number, normal. The peritoneal covering is perfectly normal except over the distal nodule, where there are two minute opaque tubercles which resemble miliary tubercles. The mesosalpinx is of normal length; the parovarium can be plainly seen and seems in every respect normal. The ovary was small, measuring 3 x 2 x 1.2 cm. Its surface was very irregular, formed in small convolutions, and contained occasionally a small cyst filled with blood, a senile ovary. A small hydatid of Morgagni was attached to the fimbriated extremity of the tube.

Left side: The tube was 0.8 cm. in length, 0.4 and 0.5 cm., 0.6 and 0.7 and 0.9 cm. in diameter. The proximal third was normal in size and of the same consistency as the corresponding portion of the other tube. At the junction of the proximal and middle thirds there was an enlargement or nodule. The remaining portion of the middle third of the tube was much softer and smaller in size. The greater part of the distal third was converted into a nodule which was much softer than the corresponding portion of the other tube. The peritoneum was normal except in the outer third, where it was covered with a few adhesions, and the closed and inverted abdominal ostium was adherent to the ovary. The

mesosalpinx was obliterated toward the fimbriated extremity of the tube, but was otherwise normal. The parovarium was normal. The ovary measured 3 x 3 x 2 cm., and presented, with the exception of an apoplexy the size of a hickory-nut, the same characteristics as that of the opposite side. On section the tube-lumen of each tube was completely obliterated in the proximal and distal thirds, and in the middle third, over the softer areas, it was somewhat dilated and filled with blood (hæmatosalpinx). The tube-walls were throughout exceedingly hard in consistency. The uterus was larger than normal, measuring 10 cm. in length, 6 cm. in width at the fundus, 4.5 cm. at the middle of the lower uterine segment, and 4 cm. throughout the entire length of the cervix. The muscular walls, particularly that of the cervix, was very much harder than normal. The peritoneal surfaces were smooth and normal. The external os was enlarged, allowing the introduction of the tip of the index-finger. There was a small bilateral laceration of the cervix. On section the muscular wall toward the endometrium was very resisting to the knife. The endometrium over the entire surface of the fundus presents small, pin-point and pin-head elevations which frequently showed punctate hemorrhages. The traces of the recent curettage were noticeable. The uterus is typically that of chronic general endometritis. These specimens showed no diagnostic characteristics of tubercular disease, except the hard nodular condition of the tube.

Microscopical examination of specimen. Sections were made, including every part of each tube and ovary and all portions of the endometrium and muscular wall, from the external os uteri to the tube at each cornu.

Left side: Sections made through the inner half of the proximal third of this tube show the mucous membrane almost completely destroyed, the only vestige left being one or two small spaces surrounded by cylindrical epithelial cells and a small amount of stroma, which is either infiltrated by epithelioid cells (a miliary tubercle) or replaced by fibrous tissue. The lumen is generally not to be seen, but when present is filled with degenerated blood. The inner two-thirds of the tube-wall is converted into dense fibrous tissue, in midst of which a small bundle of muscular tissue is sometimes seen. The presence of muscular tissue becomes much more frequent toward the peritoneal covering of the outer third, where continuous bundles are separated by a small amount of fibrous tissue. The peritoneal covering is much thicker than normal, but no miliary tubercles can be found. The outer half of this third of the tube presents the same appearance, except that the infiltration is not so chronic, small round-cell infiltration is rare, miliary tubercles are more frequent, and may contain a small giant-cell. Here, also, a few cells occupy the tube-lumen instead of blood. Sections through the nodule of the middle third of the tube show the cylindrical epithelial cells surrounding larger spaces separated by stroma composed partially of fibrous tissue, and rarely contain any tubercular tissue, but perhaps one or two minute areas of calcification. The partially destroyed mucous membrane folds of fibrous tissue forming the space described all converge and are attached to a central area of dense fibrous tissue, which contains no small round-cells and has in its centre a single miliary tubercle. The wall of the tube is the same as that described. The softened area, the distal half of the middle third of the tube, is the seat of an old hemorrhage, which either fills up the spaces surrounded by the cylindrical

epithelium, or it dissects the mucous membrane, the submucosa, from the fibrous tube-wall. Sections through the distal third of the tube show the central portion of the tube composed of a circular area of chronic fibrous tubercular tissue containing many small foci of calcification, and the centre is a space bounded by caseation. Many of the tubules here contain small giant-cells. This area of tissue is surrounded by another, which is extensively infiltrated with small round-cells, and surrounding this again are the same destroyed mucous membrane and the tube-wall of other portions of the tube. The mesosalpinx shows nothing of interest. Sections through various portions of the ovary are characteristic of senile change.

Right side: The sections made through the various portions of this tube show the mucous membrane more completely destroyed and small round-cell infiltration generally more frequent and extensive. Tubercular tissue is even less frequent and not a single giant-cell can be found. Otherwise, including the area of hemorrhage, it does not differ from that of the opposite side. The ovary shows a large area of hemorrhage surrounded by a capsule. Beside this, there is nothing of interest to be seen. The mesosalpinx is slightly thickened, but in other respects normal. Sections through the uterus show a very thin endometrium, a great part of it having been removed by the curettement, composed of the same characteristic tubercular disease found in the examination of the tissue removed by the curette. True endometrial tissue is, however, seen in an occasional gland, more often as the muscular wall is approached. The disease extends over the entire surface of the corporeal endometrium, into each cornu to the tube and as far as the internal os at the cervical endometrium. In the muscular wall, for a distance of 0.5 cm., an occasional miliary tubercle, with its giant-cell surrounding small round-cell infiltration, is very frequently seen. The cervical endometrium is simply that of a very chronic inflammation. Where the tubercular disease began is difficult to determine. A large number of sections were stained for tubercle-bacilli, but none could be found. It certainly must have been long standing and very slow in development. Both tubes were equally involved and show the chronic form of tuberculosis. Here, also, the disease was undoubtedly disappearing, becoming a conservative process. A few months later these tubes would most probably be found converted into fibrous cords. In the uterus the disease was also very chronic, but considering the fact that the muscular wall was involved to the extent of 0.5 cm. it is possible that it would have extended through the uterine wall, or by metastasis, to the peritoneum or other organs. These specimens, therefore, represent chronic fibroid tuberculosis of the corporeal endometrium, extending into the uterine wall, and bilateral fibroid tubercular salpingitis. The ovaries were not involved by the tubercular process.

Case VII.—M. H., colored, aged twenty-seven years, single, cook, nullipara. No miscarriages. Admitted to the Gynecean Hospital February 9, 1895. Menstruation first appeared at fifteen years, regular, usually lasting four days, never profuse, but painful during the period. She had the usual diseases of childhood, including scarlet fever, but otherwise has always enjoyed excellent health until three years ago, when she had an attack of pelvic peritonitis which kept her in bed for nine weeks. At this time she complained of pain in both iliac fossæ, particularly the right. Since this trouble she has not been well. Menstruation has

been much more painful, the pain beginning three or four days before the onset of the flow and lasting throughout the period. It was, however, regular and in other respects normal until September 5th. This period was ushered in with excruciating pain, principally confined to the left iliac fossa; the flow was very scanty and lasted two days. The pain persisted, and has continued with but slight interruption ever since. She has steadily lost in flesh and strength, and has had night-sweats and fever since October. Her normal weight was 150 pounds, her present weight is 115 pounds. Except that she has had a slight showing in October she has not seen a menstrual period since the one described. Has slight leucorrhœa; micturition normal. She has had diarrhœa, lasting two weeks, three times during the last two months. She has been unable to leave her bed since the September attack.

Family history: Father died at sixty-three years of age of cause unknown to patient. Mother is living and well, fifty-two years of age. Six brothers and sisters living and well. One sister died in confinement. There is no personal history of any condition which might suggest tuberculosis, and no lesion can be found on careful physical examination. There is no history as to cause of primary attack of pelvic peritonitis, but it was very probably gonorrhœal in origin.

Patient's condition before operation. She complained of pain over the entire lower abdomen, night-sweats, chills, and fever. Her temperature on admission to the hospital was 101° F., pulse 102, and respirations 28. She is very anæmic and much emaciated. The abdomen was tender to palpation, with flat percussion-note reaching as high as the umbilicus. Nothing could be outlined by vaginal examination but a small virgin cervix protruding from a dense and tender mass which completely filled the pelvis.

Cœliotomy. The pelvis was filled with a mass which consisted of the uterus firmly fixed between two large abscesses, over which lay the Fallopian tubes. Everything was matted together by adhesions, and loops of intestine were adherent posteriorly and over the mass and to the anterior parietes. In separating a loop of intestine from the right side the abscess was opened, the intestines having formed part of the wall of the cavity. About five ounces of pus having a fetid and fecal odor escaped. A cover-glass preparation was immediately made from this pus, and it was found to contain streptococci in large numbers and a long and a short bacillus, the short bacillus very probably being the bacillus coli communis. The right tube was removed with a portion of the abscess-wall on this side. The same was accomplished on the left side. A small rent which occurred in the serous coat of the intestine while freeing adhesions was repaired. Both abscess-cavities were thoroughly flushed out and the abdomen closed with glass drainage. It was necessary to cleanse the tube every fifteen minutes. On the third day her condition became alarming, her pulse having risen to 160, temperature 103.6 ° F. Feces were escaping through the tube, and the patient was in a condition of profound sepsis. At this juncture recourse was had to a measure which undoubtedly saved her life. This consisted in substituting for the original tube a double glass tube for continuous irrigation. At the same time the patient was placed upon treatment of vigorous stimulation. From this time onward, for a period of four weeks, she took sixteen ounces of whiskey, twenty grains of quinine, one-fifth grain of strychnine, one drachm of the tincture of digitalis, in divided doses

daily, and from four to six ounces of milk every hour. All this she retained, and there was seldom any tendency to nausea. Irrigation through the double tube was continued for three days. At this time the tube was accidentally broken, and, the indication for its use having ceased, a rubber tube was substituted. The patient improved, her pulse dropping to about 100 and assuming a better character, and the temperature falling to 100° F. or under. Feces continued to discharge in large quantities through the tube, and have persisted since its removal, a few days later. There has been a persistent discharge of pus at times through the fecal fistula, as well as from a fistulous tract which opened about one inch below it.

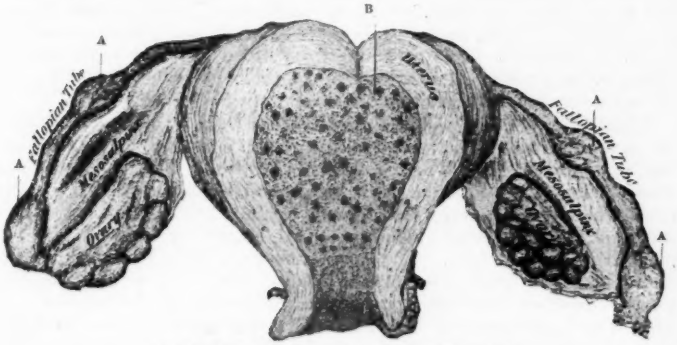
A small quantity of feces passes daily by the rectum. The urine has remained normal. Since April 3d she has been able to sit up in bed for an hour or two daily. Examination by the vagina on April 12th showed the cervix about one inch from vaginal outlet, with a bulging mass on the left side.

Macroscopic examination of specimens. The specimen consisted of the tubes from both sides, portion of the left ovary, and a mass of tissue, probably ovarian, which evidently formed the wall of an abscess.

Left side: The tube is 10 cm. in length, and 1.2, 1.5, and 2 cm. in diameter. It is much harder than normal in consistency, very tortuous, bowing itself over the ovary to which it is adherent, and progressively enlarged from its proximal to its distal extremity. The abdominal ostium was closed, and there were no signs of fimbriæ. The entire peritoneal surface was covered with adhesions, particularly posteriorly, where this portion of the tube was considerably lacerated. On section the tube-lumen is very small, but patent throughout. It contains a small amount of inspissated pus or caseous material. The portion of mucous membrane in relation with the lumen showed a narrow margin of caseating tissue. The mucous membrane was much thickened and destroyed by inflammatory disease. The tube-wall was very resisting to the knife, hypertrophied, measuring 0.3 cm. in diameter, and also showed signs of inflammation. The mesosalpinx was obliterated and a small portion of ovarian tissue, 0.2, 1.5, and 1 cm. in diameter, was in immediate relation with the tube. This portion of ovary was covered with adhesions and very much lacerated upon its posterior surface, where it must have formed part of the wall of an abscess. There were a few follicular cysts to be seen on its anterior surface, otherwise it showed nothing of interest.

Right side: The tube from this side presented about the same characteristics as that of the opposite side, except that it was not so large and there was no ovary attached. It measures 8.5 cm. in length and 1, 1.5, and 1.8 cm. in its various diameters. The abdominal ostium was closed and no fimbriæ could be seen. The tube was very tortuous, almost stony-hard in consistency, covered with the same sort of adhesions. The mucous membrane was much thickened, diseased, and that tissue which formed the immediate wall surrounding the lumen showed the same degree of fatty degeneration seen in the opposite tube. The lumen was in every part much larger than normal and was filled with inspissated pus. The mass of tissue, which evidently formed part of the wall of an abscess, was of about uniform thickness, generally 2 cm., irregularly shaped, with ragged edges measuring 8.7 cm. in length and from 2 to 3 cm. in width. It was covered on one side by smooth, normal peritoneum, beneath

which, here and there, a small follicular cyst was to be seen, hydrops folliculi. From these cysts it was concluded that the tissue was ovarian. The other surface was uniformly corrugated or convoluted, very much resembling the inner wall of a papillomatous cyst. It, however, seemed probable that it was inflammatory tissue, the wall of an abscess.



A. Tubercular nodule. B. Tubercular endometritis.

From the macroscopical examination of these specimens we believe that there was nothing to suggest tubercular disease, although it was thought of, and the pathological diagnosis would have been chronic bilateral pyosalpinx and tubo-ovarian abscess with extensive adhesions, the abscesses containing specific micro-organisms, the result of infection from the bowel or a renewal of primary gonorrhœal infection. Considering also that the cover-glass preparations, which were carefully stained for tubercle-bacilli, gave a negative result and that a large number of streptococci were found, this non-tubercular diagnosis was even more justifiable.

Microscopical examination of specimens. Sections made through the various portions of this tube, including the cornu of the uterus, show the same characteristics already described in Case VI., except that the disease is more acute and extensive—chronic diffuse miliary tuberculosis. The mucous membrane is in every part completely destroyed and replaced by a mass of tubercular tissue. The tube-lumen is filled with caseous material, and the mucous membrane, from the margin of the lumen to the muscular wall of the tube, contains at frequent intervals a small area of caseation-tissue, often forming an abscess. Between these areas of caseation the typical tubercular tissue, epithelioid and small round-cell infiltration, with giant-cells, are seen. The tubercular tissue is not, as a rule, arranged in distinct miliary tubercles with perhaps a giant-cell surrounded by small round-cell infiltration, but is diffuse, the small round-cell infiltration being distributed in indefinite areas, separated either by caseation-tissue or epithelioid infiltration, which sometimes contains a typical giant-cell. Nowhere in any section can cylindrical epithelium or stroma-tissue of the normal mucous membrane be seen. As the muscular wall is approached the small round-cell infiltration is

more extensive, and with progressive frequency small portions of muscle-fibre are seen separated by tubercular tissue. The muscular wall is infiltrated with epithelioid and small round-cells to within 0.1 cm. of the destroyed peritoneal covering. In no part is the tubercular disease seen extending beyond the limits of the tube. Sections through the mesosalpinx show a small amount of small, round-cell infiltration near the tube. The parovarium is normal. Sections made through the portion of ovary show in the proximal half chronic perioöphoritis and diffuse and sclerocystic degenerative oöphoritis, and in its distal half the same chronic diffuse miliary tuberculosis as seen in the tube. This half of the ovary probably formed the wall of an abscess.

Right side: Sections made through every portion of this tube show the same characteristic tissue seen in the opposite tube. The muscular wall is, however, more hypertrophied and infiltrated with epithelioid and small round-cells, particularly in relation with the mesosalpinx. The disease here also extends to the uterine cornu. The mesosalpinx is very short and shows a small amount of small round-cell infiltration. The parovarium is not seen. The small amount of ovarian tissue which is found attached to the mesosalpinx is converted into typical tubercular tissue. Sections from the irregular portion of tissue, the abscess-wall, show it to be composed of ovarian tissue almost destroyed by the diffuse form of tuberculosis already described. Five sections from each tube were stained for tubercle-bacilli, and three typical undoubted bacilli were found. These specimens, therefore, present bilateral chronic diffuse miliary tubercular salpingitis or pyosalpinx, localized to the mucous membrane and inner half of the muscular wall, bilateral tubercular abscess and chronic diffuse miliary tuberculosis of both ovaries, sclerocystic degenerative oöphoritis of the left ovary, and chronic bilateral perisalpingitis and perioöphoritis. It is concluded from the history and physical examination of this patient that the disease was primary in the genital tract. The uterus and portion of left ovary which was not removed must have formed part of the disease.

Case VIII.—B. L., Irish, aged thirty-four years, housewife, married ten years, nullipara, no miscarriages. Admitted to the University Hospital January 28, 1895. The menses first appeared in her fourteenth year. They have always been irregular, sometimes absent for several months, scanty, lasting two days and very painful. Except for an attack of rheumatism and her present trouble she has always been healthy. For the last fourteen years she has complained of backache and pain in both iliac fossæ. She has had a profuse leucorrhœal discharge for a number of years. The bowels are constipated. The patient first appeared for treatment at the University Hospital Dispensary in July, 1894. Local applications were made to the cervix and vaginal vault bi-weekly with marked benefit. The leucorrhœal discharge and menstrual pain almost disappeared and the pain in the iliac fossæ was much relieved. On admission to the hospital she complained of the symptoms described above. The temperature, pulse, and respirations were normal.

Family history: Mother, father, two brothers, and four sisters are living and perfectly healthy. A sister died when six months old. Husband is living and healthy. There is no possible history of tuberculosis to be gained. A careful physical examination of the patient reveals nothing suggestive of tuberculosis.

On vaginal examination the cervix was found eroded, the uterus retroverted to the second degree, and both tubes and ovaries prolapsed, tender, and adherent to each uterine cornu.

Cœliotomy. February 8, 1895. The parietal, visceral, and omental peritoneum was seen to be studded with miliary tubercles. The miliary tubercles were the size of a millet-seed, translucent, and more numerous in the pelvic cavity than elsewhere. They were evidently not of long duration. The omentum was adherent to the anterior pelvic brim. The tubes were enlarged to the size of an index-finger, with the abdominal ostii closed, and with the ovaries were covered with dense old adhesions which bound them to the pelvic floor and each lateral wall of the uterus. Both tubes and ovaries were removed. The abdomen was closed without drainage.

Convalescence was normal, the pulse ranging between 76 and 85, and the temperature never going above 100° F. She left the hospital one month after operation, apparently in good health.

Macroscopical examination of specimens. The specimens consisted of the tube and ovary from both sides. On the peritoneal surfaces of both specimens here and there, generally a centimetre apart, a translucent miliary tubercle the size of a millet-seed was to be seen.

Right side: The tube was very tortuous, 8.5 cm. in length, and covered with dense old adhesions which destroyed the peritoneum, except in the last centimetre of the distal third. It measured 0.5, 1, and 2 cm. in diameter. The abdominal ostium was closed and no sign of fimbriæ was to be seen. On section the lumen in the distal third, where the tube is dilated, measured 1.5 cm. and contained considerable clear fluid and a mass of caseous material. The lumen was obliterated in the proximal third and admitted a pin-point and head in the middle third. The mucous membrane was macroscopically destroyed in every part of the tube. The muscular wall was very resistant to the knife, slightly hypertrophied in the proximal two-thirds and about normal in thickness in the distal third. The mesosalpinx was obliterated and the tube was in immediate relation with the ovary. The ovary measured 4 x 2 x 2 cm. in diameter. It was covered with adhesions, particularly toward the paroöphoron, and was very frequently infiltrated with small cysts, hydrops folliculi. In the centre of the oöphoron there was a distended corpus luteum or apoplexy, the size of a cherry, containing coagulated blood.

Left side: This tube presented the same characteristics as that of the opposite side, except that it was not so large. It measured 7.5 cm. in length and 0.5, 0.8, and 1.5 cm. in diameter. It was covered with adhesions and progressively enlarged in the proximal two-thirds and was dilated into a cyst in the distal third. The abdominal ostium was closed. The tube-lumen was obliterated in the proximal third, the size of a probe-point in the middle third, and 1 cm. in diameter in the distal third, where it contained the same sort of fluid and caseous material as the opposite side. The mucous membrane was destroyed, the muscular wall hard in consistency, but of about normal thickness, except at the site of cyst-formation, where it had almost disappeared. The mesosalpinx was obliterated. The ovary was much smaller than normal, measuring 3 x 1.5 x 1 cm. in diameter. It was also covered with firm, old adhesions, and contained a few follicular cysts. A Kobelts cyst, the size of a pea, with a pedicle 3 cm. in length, was attached to the site of the parovarium.

Macroscopically these specimens were those of chronic salpingitis or hydrosalpinx and chronic oöphoritis, tubercular disease being suspected because of the presence of tubercular peritonitis.

Microscopical examination of specimens. Right side: Sections made through all portions of this tube show the usual characteristics of chronic fibroid tuberculosis, involving particularly the mucous membrane, but also infiltrating the inner half of the muscular wall. In the mucous membrane of the proximal two-thirds of the tube the disease is almost always confined to and destroys the stroma-tissue. The rugæ are seen to be very much distorted and enlarged and covered by intact columnar epithelial cells, which show marked proliferation. These rugæ of mucous membrane usually coalesce with other rugæ, giving an appearance somewhat like that of malignant adenoma. The stroma-tissue is generally completely replaced by epithelioid and small round-cells, which are often formed into a miliary tubercle. The miliary tubercles are of the fibroid type and sometimes contain from one to even eight or ten giant-cells. The giant-cells are unusually large and mostly composed of definitely outlined central nuclei. The small round-cell infiltration does not, as a rule, surround each miliary tubercle, but is equally distributed in the epithelial infiltration. It becomes more extensive as the lumen and proximal third of the tube are approached. None of the miliary tubercles shows signs of caseation. Toward the muscular wall the disease becomes progressively more extensive and chronic. The rugæ of mucous membrane here coalesce more frequently, the small round-cell infiltration becomes less and less extensive, and the tubercular tissue is separated by considerable dense fibrous tissue. The muscular wall is partially destroyed, particularly in its inner half, where the muscular fibres are short and separated by fibrous tissue, small round-cell or tubercular infiltration. The tubercular infiltration is often formed into a miliary tubercle which rarely contains a giant-cell. In the outer half of the muscular wall no tubercular infiltration can be found, but fibrous tissue still separates bundles of muscle-fibres. The tube is surrounded, except at the attachment of the mesosalpinx, with a thin, irregular layer of fibrous tissue, perisalpingitis. In the distal third of the tube the sections show the lumen to be very large and containing in relation with the mucous-membrane edges an irregular line of caseating tissue. Here the mucous membrane is completely destroyed and replaced by a continuous ring of chronic fibroid tubercular tissue, with caseation toward the lumen-edges. The muscular wall is very thin and almost entirely converted into fibrous tissue, infiltrated with a few small round-cells. The tubercular disease in this tube, therefore, partially or completely destroys the mucous membrane and inner half of the muscular wall, and becomes progressively more extensive as the fimbriated extremity is approached. The mesosalpinx, except that it contains considerable fibrous tissue and small round-cell infiltration, shows nothing of interest. The parovarium is not included in the disease. Sections through the ovary show the oöphoron to contain a large number of follicular cysts and old corpora lutei, and here and there, widely distributed, a miliary tubercle, surrounded by a few small round-cells. In none of these miliary tubercles can a giant-cell be found, yet they are so characteristic from the arrangement of cells that they could not be mistaken for any other condition. The ovary is also covered by a capsule of fibrous tissue—perioöphoritis.

Left side: Sections made through the various portions of this tube

show the tubercular disease to be of the same character, but much more extensive. The mucous membrane is replaced by tubercular tissue in the distal and greater portion of the middle third. Caseation is more extensive and frequent, and is seen in all sections through the distal and middle thirds of the tube. Rugæ of mucous membrane, surrounded by intact columnar epithelium, are only found in the proximal third and inner half of the middle third. In the middle third these partially destroyed rugæ appear only in that half of the mucous membrane away from the muscular wall. The half of the mucous membrane in relation with the muscular wall is composed of a mass of tubercular tissue separated by fibrous or caseous tissue. In the muscular wall the muscle-fibres are more widely separated and the inner half is converted into fibrous tissue separating miliary tubercles. No miliary tubercles or epithelial infiltration can be found in the outer half of the muscular wall except on or just beneath the surface of the layer of fibrous tissue which surrounds the tube. These miliary tubercles on the surface of the tube are seen in only one of several sections. The mesosalpinx and parovarium show nothing of interest.

The ovary. Several sections made through this ovary show perhaps one-fourth of the oöphoron infiltrated with tubercular tissue and the remaining three-fourths showing the usual changes the result of chronic oöphoritis and perioöphoritis. The tubercular disease extensively infiltrated the stroma-tissue immediately surrounding an old, but large, corpus luteum, and is composed of an irregular circle of indefinitely outlined miliary tubercles containing one, two, or three giant-cells. Small round-cell infiltration is equally distributed in the tubercular tissue and does not definitely surround miliary tubercles. The giant-cells are very large and distinctly outlined. The tubercular disease described in these specimens is characterized by the large amount of fibrous tissue, the small round-cell infiltration, the indefinitely outlined miliary tubercles with very distinct giant-cells, mostly composed of central nuclei. It seems most probable, considering the more extensive destruction of the mucous membrane and presence of caseating tissue in distal third of each tube, that the primary infection took place in this portion of the tube and extended into the uterine cornu. That the ovaries were secondarily infected from each tube is almost positive, since the disease usually infects the tube first, and also because of the more extensive disease in the tubes. It is also very possible from this examination that the uterus formed part of the tubercular disease. The fact that the previous history of the patient and the physical examination revealed nothing suggesting the possibility of a primary tubercular lesion in any other part of the body, and that the miliary tubercles were translucent and more numerous in the pelvis, we think is sufficient evidence that the primary infection took place in one or both Fallopian tubes. Ten sections from each tube were carefully stained for tubercle-bacilli, but none was found.

These specimens, therefore, present chronic primary bilateral fibroid tubercular salpingitis or hydrosalpinx; secondary chronic bilateral fibroid tubercular oöphoritis with sclerocystic degenerative oöphoritis; bilateral perisalpingitis and perioöphoritis; and secondary tubercular peritonitis.

Case IX.—A. S., German, aged forty years, housewife, married twenty years, nullipara, no miscarriages. Admitted to the University Hospital May, 1895. Menstruation first appeared at thirteen years

of age. She has had dysmenorrhœa from the beginning, but until a year ago the flow occurred every four weeks and lasted two days. For a year the flow has been very irregular and has at times continued several weeks. Three and a half years ago, immediately after lifting a heavy weight, she was seized with violent pain in the right iliac fossa. Since this time she has not been well, but has not lost in flesh. She has had a profuse leucorrhœal discharge for the last two years. She now complains of pain in both iliac fossæ, particularly the left, backache, headache, and almost continual hemorrhage from the vagina. Micturition is frequent and painful. The bowels are regular.

Previous history. She had the usual diseases of childhood. Twenty years ago she had a cough which lasted two years; since then, except for an attack of typhoid fever, twelve years ago, and her present symptoms, she has been in good health, able to do hard work as a housewife. In a careful physical examination no pulmonary or other lesions could be found.

Family history. Father is living and well, seventy-five years of age. Mother died at fifty-three years of age of cancer of the breast. Three brothers and two sisters are living and well; one brother died of phthisis. Husband is living and well.

Except that one brother died of phthisis, there is no history of tuberculosis.

Vaginal examination. External genitals negative. The uterus was small, virginal, and fixed in the pelvis by old, very dense inflammatory adhesions. Both tubes were enlarged and adherent.

Cœliotomy. May 17, 1895. The omentum was found adherent to the abdominal parietes. The small and large intestine and rectum were attached to the left Fallopian tube by firm bands of adhesions. These adhesions were separated with very great difficulty, resulting in injury to the outer wall of the rectum and small intestine, which was repaired. Both tubes and ovaries were removed. A small amount of brown material having a fecal odor escaped from the left tube during operation. The pelvic cavity was washed out with a 1 : 2000 bichloride solution, a glass-drainage tube was introduced, and the abdomen closed. Convalescence was uneventful.

Macroscopical examination of specimens. The specimens consisted of the tube and ovary from both sides.

Left side: The tube measured 12 cm. in length, and from 0.5 cm. in the proximal third to 1 cm. in diameter in the distal third. It regularly and progressively enlarged as the fimbriated extremity was approached. The abdominal ostium was closed and no fimbriæ were to be seen. The entire surface of the tube, particularly posteriorly, was covered by dense organized adhesions, showing considerable laceration; a small opening had been torn into the lumen through the posterior surface of the distal third from which a small amount of muco-purulent fluid and caseous material having a fecal odor was escaping. The tube-wall was very much increased in hardness in every part. A hard body, evidently in the tube-lumen, could be felt at the junction of the middle and distal thirds. On section the lumen was found almost obliterated in the proximal third and enlarged, measuring 0.9 to 1 cm. in diameter, in the distal two-thirds. The hard body felt through the tube-wall was a calcified mass composed of five plates which measured from 0.2 to 1 cm. in diameter. On the proximal side of this mass the lumen was filled with semifluid caseous

or calcareous material. On the distal side it contained a small amount of caseous material and considerable muco-purulent fluid. The lumen was lined by an indefinitely defined irregular layer of what seemed to be chronic inflammatory tissue. No mucous-membrane folds could be recognized in any part of the tube. The muscular wall was very much hypertrophied, measuring 0.8 cm. in the middle third of the tube. The tube immediately surrounded the ovary and was bound to it by firm adhesions. The mesosalpinx was obliterated. The ovary was very small, 2.5 x 2 x 1 cm. in diameter, and, except that it was covered with adhesions and was almost stony-hard in consistency, it showed nothing pathological.

Right side: The tube from this side was completely covered with old adhesions, destroying the peritoneum and binding it firmly to the ovary, the ovary being in contact with at least one-third of the surface of the tube. It was not so large as that of the opposite side. It measured 10 cm. in length and from 0.5 to 0.9 cm. in diameter. The abdominal ostium was closed. It was stony-hard in consistency, and on section the wall seemed to be composed of dense fibrous tissue. The lumen was frequently obliterated in the proximal half, and in the distal half it was somewhat enlarged and contained a small amount of caseous material. It was also noticed that in making sections through the distal third that the knife frequently gave a grating sensation as the lumen was approached, showing that here also calcification was present. The ovary measured 3 x 2.5 x 1 cm. in its various diameters, and was also covered with adhesions and showed considerable sclerocystic degenerative oöphoritis. The plates removed from the left tube were treated with dilute HCl, profuse and immediate effervescence resulting, thus determining that they were due to calcareous infiltration. Macroscopically, these specimens present the lesions, except for the calcification-plate, which are sometimes seen in chronic simple pyosalpinx, the transitional stage between pyosalpinx and hydrosalpinx. There was nothing in their appearance, except perhaps that calcification more often occurs where tubercular disease is present, that could have suggested their true nature, and therefore it was unsuspected.

Microscopical examination of specimens. Left side: Sections made through all portions of the tube show chronic fibroid tuberculosis, except in immediate relation with the site from which the calcification-plates were removed, where the disease is generally of the chronic diffuse variety. The process is, as a rule, an unusually chronic one, fibrous tissue predominating in every section and tubercular tissue being seen only here and there in relation with the lumen-edges and widely distributed as a single small miliary tubercle in the muscular wall. No trace of mucous-membrane stroma is to be seen, and only rarely do columnar epithelial cells still exist. A few columnar cells are seen either imbedded in the tubercular tissue or surrounding spaces just within the destroyed muscular wall. In the distal two-thirds for a short distance surrounding the lumen which contained the calcification-plates there is an area of acute inflammation and diffuse tuberculosis. The miliary tubercles are here closely associated and surrounded by a very extensive small round-cell infiltration. Here, also, a small amount of caseation is seen. Leucocytes with multiple nuclei are very frequently noticed, and for some distance the surrounding tissue is composed of small round-cells. In other sections through this portion of the tube the miliary tubercles

which infiltrate the destroyed mucous membrane generally occur singly, surrounded by a very few small round-cells. They are separated by fibrous tissue and become less and less frequent toward the muscular wall. Frequently and particularly in relation with the lumen-edges a small area of calcification is to be seen. The giant-cells, which are often seen, are unusually large and have central nuclei. In the muscular wall the muscle-fibres are short and bundles are separated by dense fibrous tissue. Occasionally a small amount of epithelioid or small round-cell infiltration is seen equally distributed in the inner two-thirds of the muscular wall. Also, a small abscess is sometimes seen in this portion of the tube and most often just outside a bloodvessel-wall. Bloodvessels are much more numerous than is usual in the muscular wall. The outer third of the muscular wall, except for a small amount of fibrous tissue separating muscle-fibres, is normal. The tube is surrounded by a thin layer of dense fibrous tissue. Sections made through the proximal third of the tube show the lumen almost obliterated or divided by a band of fibrous tissue. The lumen is lined by a narrow layer of columnar epithelial cells. Surrounding the lumen for perhaps 0.1 cm. there is a layer of fibrous tissue. No tubercular tissue and only very few small round-cells are seen in relation with the tube-lumen. Beyond the layer of fibrous tissue the muscular wall is not so extensively destroyed as in other portions of the tube. It contains an abnormally large number of bloodvessels, and around the walls of these bloodvessels either an area of epithelioid infiltration, perhaps containing a giant-cell, an area of small round-cell infiltration, or a minute abscess is to be seen. The mesosalpinx is not involved in the tubercular disease, and shows nothing of interest. Sections made through the ovary show it to be almost entirely composed of old cicatrices. There are no developing follicles. No tubercular tissue can be found. The arterial walls in all specimens show sclerotic change, and in the ovary a few are atheromatous.

Right side: Sections made through every portion of this tube show the results of a very chronic inflammation. The lumen is filled with folds of mucous membrane, which have coalesced with each other or with a central portion of fibrous tissue. The stroma is often replaced by fibrous tissue, but in only one section through the tube in the distal third is any epithelioid infiltration to be seen. In the distal third the mucous-membrane folds are attached to a layer of calcification and the lumen is patent. The muscle-wall is mostly composed of dense fibrous tissue, the muscle-fibres having almost disappeared. Nowhere in the muscle-wall can tubercular tissue be seen. The ovary shows extensive sclerocystic degenerative oöphoritis. A very small amount of stroma-tissue and no developing follicles are to be seen; a distinct irregular layer of fibrous tissue surrounds the ovary and tube in all of the sections. Although a large number of sections were stained for tubercle-bacilli, none could be found. From this examination it is shown that the tubercular disease was almost entirely confined to the left tube, only a single section through the right tube showing epithelioid infiltration, and that the disease was the more extensive and acute in the distal two-thirds. It is, however, almost positive that the right tube had also been extensively infected; but through a conservative process the tubercular tissue was almost completely converted into fibrous tissue and calcareous infiltration. Although the disease in the tube was a very chronic fibroid variety of tuberculosis, the almost universal involvement of the

muscular wall with distributed tubercular infiltration, which generally immediately surrounded bloodvessels, makes it appear very probable that the peritoneum or other organs might have become secondarily infected. That the disease was primary unsuspected tuberculosis of the Fallopian tubes is self-evident.

These specimens, therefore, represent primary chronic bilateral tubercular salpingitis or pyosalpinx with calcification; bilateral chronic perisalpingitis, chronic oöphoritis of the left side; sclerocystic degenerative oöphoritis of the right side; and bilateral chronic perioöphoritis.

In three of these cases no diagnosis of tuberculosis of the Fallopian tubes was made before the operation. In Case VI. tubal tuberculosis was suspected because preliminary curetting had shown the presence of tuberculosis of the endometrium.

In Cases VII. and IX. there was nothing seen at the time of operation except, perhaps, the very strong adhesions, and the calcareous plates in Case IX., which would excite suspicion of tubal tuberculosis. In Case VIII. a probable diagnosis could be made from the presence of tuberculosis of the peritoneum.

In all these cases the tubercular disease seems to have been primary in the genital tract. There was no history of previous tuberculosis in any other part of the body. In Cases VII., VIII., and IX. it was primary in the Fallopian tubes.

In Case VI., though we may say that tuberculosis was primary in the genital tract, we cannot determine whether it began in the uterus or in the Fallopian tubes. In this case the husband had died of pulmonary tuberculosis. In Cases VIII. and IX. the husbands were living and well.

From a pathological standpoint these cases may be classed as follows:

1. Chronic fibroid tuberculosis of the corporeal endometrium extending into the uterine wall, and bilateral fibroid tubercular salpingitis.

2. Bilateral chronic diffuse miliary tubercular salpingitis or pyosalpinx, bilateral tubercular abscess, and chronic diffuse miliary tuberculosis of the ovaries.

3. Bilateral fibroid tubercular salpingitis or hydrosalpinx, bilateral fibroid tubercular oöphoritis, and secondary tubercular peritonitis.

4. Bilateral chronic tubercular salpingitis or pyosalpinx, with calcification.

STONES IN THE COMMON DUCT AND THEIR SURGICAL TREATMENT,

WITH REMARKS ON THE BALL-VALVE ACTION OF FLOATING CHOLEDOCHUS-STONES.

By Christian Fenger, M.D.,
of Chicago.

(Continued from page 156.)

Anatomy. In attempting to outline the field of operation for the common duct, and its topographical anatomy, it must be remembered that when operating we do not have a normal duct to deal with, but a duct more or less dilated. I, therefore, think it justifiable to use the specimen here presented as a paradigm, and the exact anatomical relations between the organs in the hilus of the liver in this specimen will hold good for the majority of the cases of this kind with which we have to deal. I have found this to be the case in four out of five cases in which I have operated, and think it safe to conclude that the conditions about to be described will be those generally found. I will describe the organs in the position in which the operations are made; the patient lying on the table in the dorsal position and the anterior border of the liver held up by assistants, which makes its normally somewhat dependent position almost vertical; that is, the plane of the lower surface of the liver forms a right angle with the frontal plane of the body. Thus, the vertical position is changed, when the patient is upright, to a horizontal position. This does not change the relations of right to left, but changes the anterior or horizontal direction to a vertical or upright one, and *vice versa*. The vessels, bile-passages, and duodenum have been injected with colored paraffin. (See colored plates I and II.)

The organs to be considered are located between the two folds of the hepatico-duodenal ligament. This extends from the transverse sulcus, called the hilus of the liver, downward and consequently backward to the transverse colon, the duodenum, and the lesser curvature of the stomach, from right to left. Its right border is free and forms a free border between the posterior and anterior surface, being the free border of the entrance to the cavity of the lesser omentum, the anterior border of the so-called foramen of Winslow. The posterior surface is the anterior wall of the beginning of the lesser omental sac, and a finger introduced at this point will have the bile-ducts, vena porta, and hepatic artery on its anterior surface. The anterior surface of the ligament is covered with peritoneum from the large peritoneal cavity, continuous with the anterior surface of the greater omentum. When the index and third fingers of the left hand are passed into the foramen of Winslow

and the thumb laid on the anterior surface of the ligament, the organs in question will be between the ends of the fingers. The ligament is on the average 5 to 6 cm. long, 3 to 4 cm. broad; its direction, being the direction of the common duct, is oblique, and forms an angle of about 54° with the frontal plane of the body.

Lymph-glands. In the loose connective tissue below the anterior (lower) surface of the ligament are situated from two to four lymph-glands, usually somewhat enlarged; I have seen them as large as a walnut. The upper, anterior glands are situated on the vena porta; the lower, posterior ones on the anterior surface of the common duct. In the connective tissue in this locality and running in the direction of the common duct there are three or more branches of the vena porta 1 to 2 mm. in diameter, 3 to 4 cm. long, and two or three branches of the hepatic artery of the same length and about 1 mm. in diameter.

Common Duct. The common duct is 6 to 7 cm. long, runs in an oblique direction, forming an angle of 45° with the frontal plane of the body, and when it contains a stone or stones is ordinarily dilated. It is thus 15 to 20 mm. in diameter, and may be divided into three portions, each 2 to 2½ cm. long. .

The upper or anterior portion, nearest the hilus, begins at the junction of the cystic and hepatic ducts. Its upper half is partially covered with the main trunk of the vena porta, which gradually retreats from its anterior to its posterior surface, to disappear behind the common duct at about its middle.

The middle portion has no vena porta on its anterior surface, but the upper half of the lower or right border is overlapped by the retreating vena porta. At its upper or left border the hepatic artery passes behind it on its way to the hilus of the liver, and at this point gives off a branch which passes forward on the anterior surface of the common duct, where it divides into two branches, one of which runs upward and to the right to the cystic duct, the other downward and to the left on the anterior surface of the lower half of the common duct. This middle portion of the common duct, the anterior surface of which is not in relation with the vena porta, is the place of choice for the incision in choledocholithotomy, as at this point only small branches of the vena porta and hepatic artery, as already described, are met with—vessels too small to cause serious or uncontrollable hemorrhage. Its upper border, together with the right free border of the duodenum and the hepatic artery, forms a triangular space.

The third, lower or posterior portion of the duct is almost entirely hidden by the duodenum which covers its anterior surface and its entire upper border for 2 to 2½ cm., while only 1 to 1½ cm. of its lower border is covered by the intestine. This part of the duct lies partly in the head of the pancreas. Its lower end is, as a rule, dilated and forms a

cul-de-sac, usually a little smaller than the duct higher up, and at some place in this cul-de-sac (the dilated diverticulum Vateri) the opening into the duodenum is situated. The possibility of passing a sound down into the intestine from the incised common duct depends upon the situation of the duodenal opening in this cul-de-sac, and upon the direction of the canal through the wall of the duodenum. In some cases it is easy to pass a sound down, in others impossible, although the opening may allow free exit to bile (this may be due to valve-formation or to the fact that the probe or bougie is caught in a fold). The head of the pancreas overlaps or comes down below the lower border of this portion of the duct for 1 cm. or more.

Vena Porta. The vena porta commences behind the pancreas, runs as a trunk 18 mm. in diameter from left to right, slightly upward, first, behind the middle portion of the common duct; about its middle it emerges on the lower or right border of the duct and runs from here upward and to the right for a distance of 3 to 3½ cm., when it divides into its hepatic branches. On its way it passes from the posterior surface around the lower border up on to the anterior surface of the upper portion of the duct and covers the lower part of this, extending to or a little upon the cystic duct. The terminal portion of the vena porta is situated on the anterior surface of, and consequently covers, the hepatic duct and its branches. Its termination is about 10 cm. above and to the right of the end of the cystic duct; in dividing, it gives off a main branch for the right lobe of the liver at an angle of about 110°, which passes downward and to the right. This main branch is 1½ cm. long and 10 to 12 mm. in diameter. From the place of division a branch for the quadrate lobe, 2 cm. long and 7 mm. in diameter, passes downward, backward, and a little to the left. At the left border and behind this branch is the bile duct for this territory of the liver, which is 3 mm. in diameter. Behind the bend and the upper border of the branch to the right lobe the upper border of the right branch of the hepatic duct comes into view. At the place where the trunk of the vena porta curves around from the lower upon the anterior surface of the common duct it takes up three other branches which run along this surface.

Hepatic Artery. From behind the pancreas, the hepatic artery, with a trunk 3 mm. in diameter, passes from left to right into the hepatico-duodenal ligament, for a distance of 15 mm. from the right border of the duodenum horizontally to the right until it reaches the common duct; then on its posterior surface into the hilus of the liver. When it reaches the common duct it gives off a branch which passes forward to the anterior surface of the common duct. This branch soon divides into two or three smaller branches, one running upward and to the right for the upper part of the common duct and the cystic duct, the others down-

ward and to the left to supply the middle and lower portions of the common duct.

Cystic Duct. The cystic duct is about 4 cm. long; its lower half, which runs upward and to the right in the direction of the common duct, is 10 mm. in diameter, but gradually diminishes until its diameter is only 4 mm. Its upper portion runs vertically, forming an obtuse angle with the lower portion, the concavity being to the left. At its entrance into the gall-bladder in this specimen it is only 3 mm. in diameter. (In the specimen here described a round diverticulum, thin-walled, 2 cm. in diameter, was found upon its upper vertical portion.) The upper or distal half of the cystic duct may be incised in a vertical direction for the removal of stone at any place in its extent without wounding the vena porta; the lower or proximal half should be incised for stone as far from its lower or right border as possible so as to avoid wounding the vena porta.

Hepatic Duct and its Branches. The hepatic duct goes off from the common duct at the same place as the cystic duct and bends backward behind the latter and behind the vena porta and its branches. It is 2½ to 3 centimetres long, passes to the right, downward and backward, and then divides into the branches for the liver. The upper border of the upper anterior branch to the right lobe can be seen behind and over the border of the vena porta. The branch to the quadrate lobe can be seen to the left behind the corresponding branch of the vena porta. The hepatic duct is thus situated behind and is covered by the cystic duct and the vena porta. A stone in this duct can therefore scarcely be felt from the anterior surface through these two organs, and when a floating stone is pushed or passes up here it apparently disappears into the liver, and search and manipulation are required to bring it again down into the common duct.

Gall-bladder. The gall-bladder, when distended, is pear-shaped, with its fundus toward the free border of the liver which, in its normal condition, it never overlaps, so that it can never be felt when the condition of the patient is normal (Rheinstein). It is from 8 to 14 cm. long and 3 cm. in diameter. At the entrance to the cystic duct it narrows down to 3 mm. in diameter. When retracted and atrophic from inflammation or protracted emptiness and disuse, as in the specimen here described, it may shrink to a length of 4 cm. and to a diameter of 1½ cm., or, as in Case V., to even smaller dimensions.

REMARKS. The descriptive anatomy as detailed in the text- and hand-books differs to a great extent from that just given, partly because of the pathological condition of the specimen described—the dilatation of the common and hepatic ducts and the atrophy of the gall-bladder; but at the same time the position of the vena porta in its relation to the bile-ducts is so different from that given by Henle that I hardly think that

the entire difference can be due to the pathological condition. Henle says (page 200): "The common duct is situated at the right free border of the hepatico-duodenal ligament or at the free border which forms the fold at the entrance of the foramen of Winslow. The hepatic artery is situated on its left side close to it, and behind both lies the vena porta."

These are entirely different relations between the upper part of the common duct, and particularly the hepatic duct, from those found by me, and would naturally lead to the conclusion that any of these ducts might be incised without risk of opening into the vena porta. From the relations described by me it will be seen that a stone in the hepatic duct cannot be cut down upon without passing through the vena porta, with the exception, perhaps, of a small place at the beginning of the duct and behind the cystic duct. In the upper half of the common duct it is unsafe to incise close to the free border of the hepatico-duodenal ligament, because the vena porta here may overlap the right or lower border of the common duct; and it is only the lower half of the common duct that lies close to the free border of the ligament, entirely covering the vena porta. Thus only the lower or right half of the common duct can be incised without danger of opening into the vena porta.

Pathology. It has been the general belief that most of the choledochus-stones are formed in the gall-bladder and pass secondarily through the cystic duct down into the common duct. We also know that stones form in the hepatic branches and consequently, in all probability, also in the hepatic and common ducts. In 62 out of 150 cases, one or more stones were found in the common duct alone. In the remaining 88 cases stones were found simultaneously in one or more of the biliary passages. (Courvoisier.)

The stones in the common duct are ordinarily from 1 to 2 cm. in diameter; that is, they are on the average larger than the stones in the gall-bladder. In two-thirds of the cases only one stone has been found; in the remainder from two to six, but seldom in large number. The shape is usually oval, more rarely globular or irregular.

The locality in the common duct where the stones are found (according to Courvoisier) is, in 67 per cent. of the cases, the lower or duodenal portion, in about 15 per cent. in the upper or hepatic portion, and in the remaining 18 per cent. in the middle portion. I think it is singular that Courvoisier devotes so little attention to floating stones. He says: "The stone was sometimes—in 5 cases only out of 150—found movable in both directions in its cul-de-sac," but does not seem to appreciate that a stone might float through the entire common duct. As he makes his deductions from the literature, it is likely that other authors have overlooked the mobility of the stones in many cases and have simply noted the place where the stone was found, paying no attention whatever to the ease with which it could be moved; for instance, from the

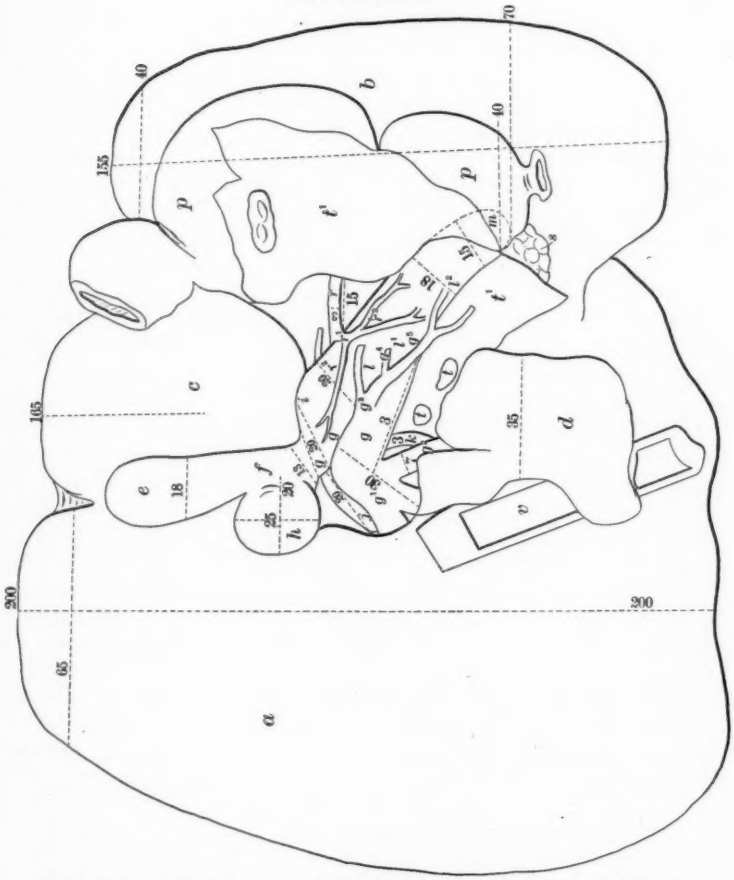
more narrow duodenal portion up into the wider upper territory of the common duct.

The natural and usual effect of a stone in the common duct is occlusion to the passage of bile and subsequent dilatation of the biliary passages in a proximal direction. Dilatation of the common duct was noted in 47 out of 200 cases. The duct was dilated from the size of the thumb up to 2 to 4 cm. in diameter. It was rarely—in 14 cases only—dilated to a large cyst-like cavity. The hepatic duct and its intrahepatic branches were found dilated in 25 per cent. of the cases. While it was always believed previously that the gall-bladder would be found dilated in cases of obstruction from choledochus-stones, Courvoisier found, in 1890, to his great surprise, that the gall-bladder was atrophic and more or less empty in 80 per cent. of the cases of choledochus-stone and dilated in only 20 per cent. He explains this curious fact in the following manner: Supposing the stones are found in the gall-bladder and have secondarily emigrated to the common duct, they have caused while in the gall-bladder a chronic inflammation of its walls, terminating in retraction and atrophy. In support of this view, he mentions cases in which local losses of substance or cicatricial territories indicated pre-existing gall-stones. But in many cases such traces of local injury are not found; the cystic duct is open and normal. The atrophy in these cases, hitherto incomprehensible, is easily explained by the ball-valve action of a floating choledochus-stone at the distal end of the cystic duct, as described above. This atrophy of the gall-bladder is, as Courvoisier has rightly pointed out, so characteristic for choledochus-stone that it is a valuable symptom in the differential diagnosis between stone and other causes of occlusion of the common duct.

Out of 35 operations for obstruction of the common duct, collected by Courvoisier, 17 were on account of stone and 18 on account of non-calculous obstructions, strictures, tumors, obstructions within or outside of the duct, etc. In 4 of the 17 cases of stone the gall-bladder was dilated; in 13 it was atrophic. In the 18 cases of non-calculous obstruction the gall-bladder was dilated in 16, and in only 2 was there no ectasia.

The contents of the dilated biliary passages is ordinarily bile, either normal, light yellow, or thickened and dark. Pus was found in only a minority of the cases; empyema of the gall-bladder in 8 cases; empyema of the bile-ducts—that is, suppurative cholangitis—in 5 cases; and these conditions combined, in 5 out of a total of 18 cases. In 10 cases only, the dilated biliary passages contained no bile, but either watery, colorless, or slightly mucoid fluid bearing no resemblance to bile, a condition of acholia ascribed to pressure-atrophy of the liver-cells, depriving them of the faculty of manufacturing bile. In all the 10 cases collected by Courvoisier, not one case of gall-stone was found,

Key to Plate I.



a. Right lobe. *b*. Left lobe. *c*. Quadrate lobe. *d*. Lobus Spigelii. *e*. Gall-bladder. *f*. Upper vertical portion of cystic duct. *g*. Lower oblique portion of cystic duct. *h*. Diverticulum in upper portion of cystic duct. *i*. Hepatic duct. *j*. Branch of hepatic duct to right lobe. *k*. Branch of hepatic duct to lobus Spigelii. *l*. Common duct, upper portion. l^1. Common duct, medial portion. l^2. Common duct, lower portion. *m*. Diverticulum of Vater. *p*. Duodenum. *q*. Vena porta. q^1. Vena porta branch to right lobe. q^2. Vena porta branch to lobus Spigelii. q^3. Vena porta branch taking up—q^4. q^5. Smaller branches of vena porta from anterior surface of common duct located in hepatico-duodenal ligament below its anterior peritoneal surface. *r*. Trunk of hepatic artery. r^1. Branch of hepatic artery to anterior surface of common duct giving off—r^2. Branch of hepatic and cystic ducts, and r^3. Branch of lower half of common duct. *s*. Pancreas. *t*. Lymph-glands in hepatico-duodenal ligament. t^1. Peritoneal surface of hepatico-duodenal ligament divided and dissected off from vena porta and common duct. *v*. Vena cava inferior.

PLATE I.

but tumors in or outside of the duct, and in 1 case pyæmia was observed.

The relation of the icterus to "gall-stone disease," or gall-stone in the different parts of the bile-passages, is as follows:—

Stones in the gall-bladder cause no icterus (the so-called "gall-stone colic" is suppuration of the gall-bladder).

Stones in the cystic duct—

(*a*) In the upper proximal half cause no icterus.

(*b*) In the lower distal half may cause icterus from compression of the hepatic duct.

Stone in the common duct causes icterus by impaction, obstruction, or ball-valve action.

Stone in the hepatic duct causes icterus when impacted in a narrow duct.

Symptoms. In the attempt to build up a special group of symptoms characteristic for stone in the common duct we are confronted with certain difficulties:—

1. In nearly one-half of the cases stones are present not only in the common duct, but also in some other portions of the biliary passages.

2. Very few authors have attempted to separate the cases of choledochus-stone, as a distinct group, from the general gall-stone group, but have given the symptoms of the entire class. Courvoisier was, I believe, one of the first to make a separate classification, and I agree with him that it is possible to differentiate choledochus-stone as a distinct class, by means of a somewhat characteristic group of symptoms:

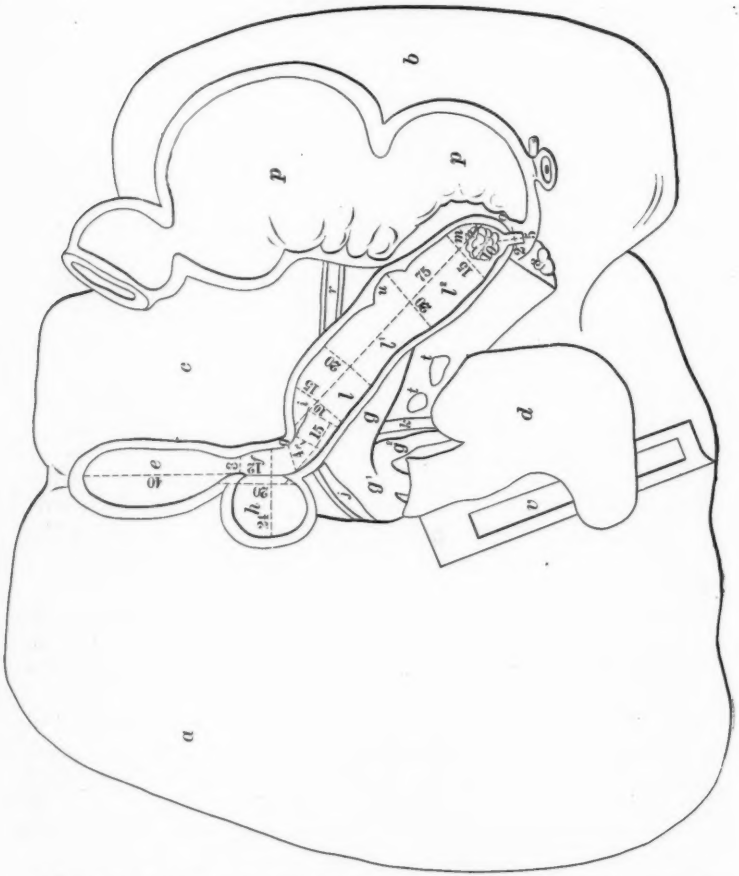
1. *Gall-bladder.* The condition of the gall-bladder, as has already been stated, furnishes valuable information. Atrophy, or at least absence of tumor, abscess, or local tenderness in this locality, is characteristic for uncomplicated choledochus-stone. (Courvoisier.)

2. *Icterus.* The most important, or, as Courvoisier avers, the cardinal symptom in choledochus-obstruction is icterus. It must be present when obstruction occurs. Multiple small stones may not obstruct the flow of bile, but larger stones will do so, either by occlusion of the lumen of the duct or by ball-valve action. And one very small stone may, as in Case V., cause intermittent obstruction by ball-valve action.

The icterus is rarely continuous and equal in intensity for a long time, because a large stone is seldom permanently wedged in the duct. In cases of choledochus-stone the icterus is ordinarily intermittent or remittent.

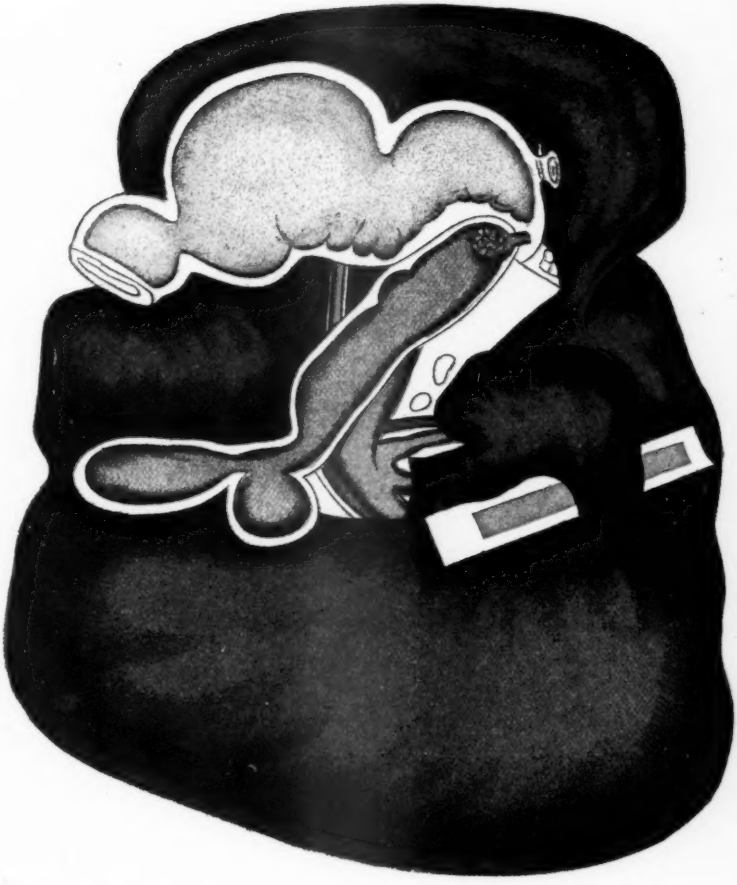
(*a*) *Intermittent Attacks of Icterus.* A few attacks of relatively short duration, separated by free intervals of months or years, are found in 25 per cent. of the cases of choledochus-stone. This probably signifies passage of gall-stones into the duodenum. It is the classic gall-stone colic with icterus, and is consequently characteristic, not of a larger stone remaining in the duct, but of smaller stones passing out. The

Key to Plate II.



a. Right lobe. *b*. Left lobe. *c*. Quadrate lobe. *d*. Lobus Spigelii. *e*. Gall-bladder. *f*. Upper vertical portion of cystic duct. *g*. Lower oblique portion of cystic duct. *h*. Diverticulum in upper portion of cystic duct. *i*. Hepatic duct. *j*. Branch of hepatic duct to right lobe. *k*. Branch of hepatic duct to lobus Spigelii. *l*. Common duct, upper portion. l^1. Common duct, medial portion. l^2. Common duct, lower or duodenal portion. *m*. Diverticulum of Vater. *n*. Stone in diverticulum. *o*. Duodenal opening of common duct. *p*. Duodenum. *q*. Vena porta. q^1. Vena porta branch to right lobe. q^2. Vena porta branch to lobus Spigelii. *r*. Trunk of hepatic artery. *s*. Pancreas. *t*. Lymph-glands in hepatico-duodenal ligament. *u*. Diverticulum in common duct. *v*. Vena cava inferior.

PLATE II.



occurrence of icterus with colic as a distinct, rare attack occurring occasionally in the history of choledochus-stone, speaks for gall-stone disease in general, as compared with other causes of obstruction, such as tumor, compression, stenosis, etc.

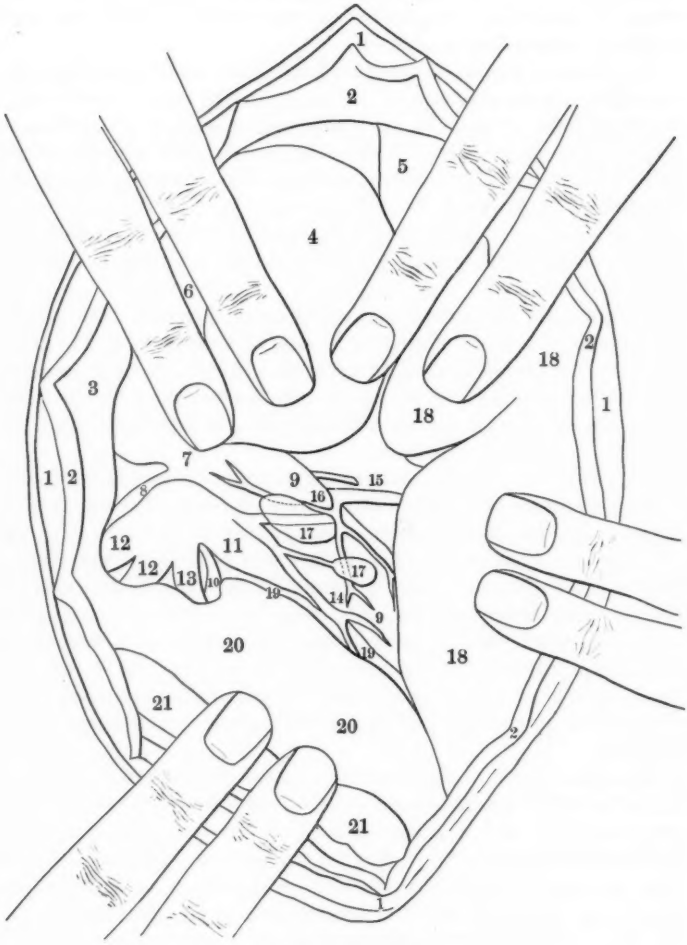
(*b*) *Remittent Icterus*, on the other hand, slight, and, as we might say, incomplete attacks of icterus, occurring as often as once or twice a week, is characteristic of stone in the common duct, and, in my opinion, of floating choledochus-stone. This remittence is such that the icterus varies in intensity. In the short interval between attacks of complete occlusion, with a day or two of clay-colored stools, followed by the presence of bile in the passages, the skin becomes less yellow, but another occlusion takes place before the icteric color has had time to disappear entirely.

In rare cases the icterus may temporarily disappear because of a longer interval between attacks, or because of a shorter period of occlusion—one day, for example. In such cases the icterus is incomplete, the skin may be yellowish, but the conjunctiva normal, with bile in the urine, and the interval may be sufficiently long to allow even this slight icterus to disappear temporarily.

Cruveilhier gives the following explanation of remittent icterus: During the attack of complete icterus with clay-colored stools the stone is tightly grasped by or wedged in the wall of the common duct, and complete occlusion occurs. Accumulation of bile on the proximal or liver side of the stone causes dilatation of the duct on this side, the wall is pressed away from the stone, some bile is thereby permitted to pass down, and a state of incomplete occlusion ensues with bile-colored stools and decrease of the icterus. The distention of the duct on the proximal side of the stone subsides, the wall again contracts closely over the stone, and the preparation for another exacerbation is now complete.

Courvoisier found in the literature 12 cases of this form of remittent icterus in which autopsies were obtained; in 9 cases choledochus-stone was found, and in 3 a tumor was found in the duct. He thinks that Cruveilhier is right, and considers his explanation "plausible" for the cases of tumor in the duct and for some cases of single or multiple large stone when immovably fixed or situated in a locally dilated portion of the duct. His explanation cannot, however, in my opinion be accepted for small stones, when a stone, for example, 1 cm. in diameter, is located in a duct 2 cm. in diameter, or when a stone is present which is movable or floating not only during the attack of icterus (as in my Case I.), but also during the intervals between attacks (as in the cases in which I operated). In such cases, and I believe them to be vastly in the majority, the frequency of the attacks of incomplete icterus or the remit-

Key to Plate III.



Field of Operation.

1. Wound through abdominal wall. 2. Parietal peritoneum sutured to skin. 3. Right lobe of liver, lower surface. 4. Quadrate lobe of liver. 5. Suspensory ligament of liver. 6. Gall-bladder. 7. Cystic duct. 8. Hepatic duct. 9. Common duct. 10. Branch of hepatic duct to lobus Spigelii. 11. Trunk of vena porta. 12. Branches of vena porta to right lobe. 13. Branches of vena porta to lobus Spigelii. 14. Small branch of vena porta in hepatico-duodenal ligament. 15. Hepatic artery. 16. Branches of hepatic artery to hepatico-duodenal ligament. 17. Lymph-glands in hepatico-duodenal ligament. 18. Duodenum. 19. Entrance to foramen of Winslow. 20. Hepatico-colic ligament. 21. Transverse colon.

PLATE III.

tence of the icterus cannot be explained in any other way than by ball-valve action.

The exacerbation in the remittent icterus not infrequently follows a heavy meal. A distended stomach adherent to the hilus of the liver or the wall of the gall-bladder, as we so often find it in these cases, is likely so to displace the floating stone as to bring on an attack, by pushing the stone down into the cul-de-sac in the duodenal end of the duct, the diverticulum of Vater.

If Courvoisier's explanation is correct, the increased secretion of bile following a heavy meal would act in an opposite manner and would cause an existing attack to disappear by permitting some bile to pass by the obstructing stone.

I might even go so far as to say that the frequently repeated incomplete attacks of icterus—the remittent icterus—rather indicate choledochus-stone and ball-valve action from a floating stone.

Is icterus present in cholelithiasis outside of the common and hepatic ducts? In stones of the gall-bladder with or without inflammation it is not present. If the stone enter the dilated cystic duct, it may, by its size or possibly by pericystic inflammation, cause compression of the hepatic duct and icterus. This would explain those cases of stone in the gall-bladder in which icterus is present and removal of the stones by cholecystotomy effects a cure. In some cases the cystic duct might be large enough to permit the stones to float down into the common duct and back into the gall-bladder. Remittent icterus would, of course, be expected in such cases.

Continuous or remittent icterus persisting for years may be caused by stone or by non-calculous occlusion. If the icterus exists for two or more years without cachexia, it is probably due to stone, because a malignant tumor in the duct or duodenum would cause death in a shorter time. Lawson Tait states that intense icterus lasting for years speaks for stone in contradistinction to tumor. Courvoisier, from his investigation of the literature, arrives at a diametrically opposite conclusion. Intense and continuous icterus on the whole speaks for tumor; but Lawson Tait is correct in stating that icterus extending over a number of years is presumptive evidence of stone. This explanation will render possible the reconciliation of the opinions of both these authors.

3. *Colic.* It is generally conceded that colic is a capital symptom of stone in the biliary passages. In eighty cases of obstruction from choledochus-stones collected by Courvoisier he found colic in 51, or 63.7 per cent.; the symptom was not mentioned in 19, or 23.7 per cent.; and it was positively stated to be absent in 10, or 12.5 per cent. In seventy-four cases of obstruction from tumors colic was noted in only 9 cases, or 12.2 per cent., and was absent in 65, or 87.8 per cent. Thus it will

be seen that colic speaks strongly for choledochus-stone as the cause of occlusion, as opposed to tumors.

Preceding attacks of colic indicate choledochus-stone which has passed into the duodenum. Courvoisier states that in fifty-one cases of choledochus-stone colic stones were found in the feces in only five cases.

Colic is a natural companion to icterus of sudden onset, but continued attacks of colic and icterus speak for occlusion from stone in the common duct, either temporary, when the stone passes down into the duodenum, which is relatively rare; remittent, in floating choledochus-stones, which is common; or, finally, permanent, when the stone is impacted and causes complete, permanent occlusion, which is also rare.

4. *Localization of Pain.* In the cases of stone in the common duct the pain, according to my observation, is seldom localized in the region of the gall-bladder or in the right hypochondrium, unless concomitant inflammation of the gall-bladder, caused by stones in that viscus, is present. I found the pain located in the epigastrium in Cases II., III., and V.; in III. and V. there was simultaneous pain in the region of the gall-bladder. The pain was located in both lumbar regions in Case VI.; equally in both hypochondriac regions in Cases V. and VI.; and in the lower part of the back or lower dorsal region in Cases I., II., III., and VI. I consider this localization of pain outside of the gall-bladder as a characteristic symptom of floating choledochus-stone.

5. *Remittent Pain.* The frequent remittence of pain, either slow or sudden in onset, and suddenly disappearing, attended by a flow of bile, but with no stone in the feces, signifies a single stone or a few stones that do not pass through, but float in a dilated common duct. The attacks of colic or pain in the course of the disease become more and more frequent, from once or twice a month to once or twice a week, and in some cases even daily. In Case II. the attack of pain lasted for ten hours; in Case V. from half an hour to two hours.

6. *Vomiting.* Vomiting was present in Cases I., II., III., and V. In Case VI. the patient experienced relief from vomiting, so much so that she was accustomed to force vomiting in order to gain relief from the pain.

7. *Relief of Pain in Certain Positions.* The pain is frequently relieved and the attack brought to an end by changes of position, which probably displace the floating stone, or by the maintenance of some one position. In Case IV. the patient obtained relief by lying on the stomach; in Case VI. by inducing vomiting; in Case V. by flexing the thighs upon the abdomen.

8. *Loss of Weight.* An important and characteristic symptom I have found to be the rapid and considerable loss of weight, which cannot be explained by fever, as fever is either absent or only of slight degree; by sepsis in the bile, as the bile may be aseptic, as in Case IV.; or by the

severity of the icterus, as icterus is frequently slight, and as the feces are intermittently or generally bile-colored. The loss of weight must, in my opinion, be attributed to intermittent, frequent ptomaïne-intoxication—that is, bile-absorption, as well as to disturbed digestion.

The loss of weight is characteristic and rapid, and after the operation the patient rapidly regains weight. In Case I. the loss of weight was sixty pounds; in Case II. the patient lost fifteen pounds in ten weeks, but after the operation gained fifty pounds in three months; in Case III. the patient lost fifty pounds, and after the operation gained twenty pounds in three months; in Case IV. the patient lost twenty-five pounds in seventeen days, and after the operation gained forty pounds in forty days; in Case V. the patient lost twenty-three pounds; and in Case VI. the patient lost fifty-three pounds, and since the operation has gained thirty-eight pounds in weight. In Czerny's Case XX., reported by Mermann, the patient lost thirty-six pounds, and after the operation gained forty pounds in nine months; in Case XXI. the patient gained four pounds in one month after the operation; and in Case XXII. there was a loss of weight of twenty-five pounds.

9. *Fever.* Intermittent or remittent biliary fever ordinarily follows or precedes the attacks of colic and icterus. It is not yet decided whether this rise in temperature is due to absorption of retained aseptic bile, or whether the microbic invasion from the intestine, which infects the bile, causes inflammation of the wall of the duct, thus making the fever septic. Charcot described an intermittent hepatic fever due to absorption of retained aseptic bile. Schüppel is inclined to believe that inflammation—that is, infection from microbes—is essential in the causation of fever. Courvoisier, after analyzing the cases collected from the literature, found fever in 25 per cent. of the cases of occlusion from stone, and only in 10 per cent. of the cases of occlusion due to other causes. In all these latter cases he found a well-defined microbic cause for the fever. He, therefore, accepts Schüppel's opinion in this regard. Acorimbini believes that the fever is caused by bacteria which enter the bile-passages from the duodenum or from the circulation. He states that the bacterium coli communis is normally found in the bile-passages, and is a factor in the formation of gall-stones. The bacteria cause a desquamative angiocholitis (Dujardin-Beaumetz, Mosler, Naunyn), and the stone contains the colon-bacillus throughout its mass. When the stone has formed it causes abrasion of the epithelium of the ducts, and the microbes enter and cause inflammation of the wall, which leads to the plastic peritonitis which causes the formation of adhesions between the peritoneal surfaces of the ducts and the surrounding organs.

It seems to me, however, that we cannot positively deny the possibility of a rise in temperature due to the absorption of aseptic bile caused by sudden retention from obstruction due to stone. The fever, according

to R. Schmitz, sometimes precedes the colic, and is consequently the earliest symptom of occlusion. If bacterial infection and inflammation of the wall of the ducts cause the fever, why should it cease with the removal of the obstruction? If infection of the bile contained in the biliary passages, the bile being the culture-medium for the bacteria contained in the stone, and if the ptomaïnes thereby produced cause the fever by their absorption, why should the fever in some cases be the earliest symptom, even preceding the pain caused by the obstruction? Furthermore, would we not expect to find in all cases of stone causing remittent attacks of fever that the bile contained some of the microbes, even the most innocent, the colon-bacillus? In my Case IV. the bile from the common duct was sterile, and yet the attacks of retention were always accompanied by marked fever.

Operation. Many operations have been employed for the removal of stone in the common duct.

Indirect lithotripsy, crushing, leaves débris, some of which may remain in a pouch in the duct, increase in size, and, as the stone is always a bacterial depot, may cause inflammation of the wall or even cholangitis.

Cholecystenterostomy, the formation of an anastomosis between the gall-bladder and the jejunum, is only possible when the cystic duct is patent.

Choledochoduodenostomy is more generally applicable, but it does not remove the stone, and consequently does not remove the cause of septic inflammation, even if it removes the retention of bile and icterus. A patient of Körte's died from cholangitis caused by a choledochus-stone, notwithstanding the existence of a duodenal fistula which permitted free egress to the bile.

Cholecystenterostomy is an operation of necessity when the obstruction cannot be found or removed. It is never an operation of choice, and will very rarely be called for in cases of choledochus-stone.

Cholecystotomy. It is only in rare cases that a choledochus-stone can be removed through the gall-bladder; namely, when the cystic duct is so dilated as to permit the passage of the stones back into the gall-bladder or of a forceps down to grasp or crush the stones. It is impossible, however, to be sure of removing all of the multiple floating stones through the gall-bladder, as the exploration of the common duct through its lumen can be accomplished only very imperfectly by a sound or probe hrough the gall-bladder.

Perfect, thorough exploration of the common duct should be made by the finger, and should extend up into the hepatic duct, and this can be accomplished only by choledochotomy and exploration through the opening thus made.

The only remaining operation of choice, which has a legitimate field, but is rarely called for, is the trans-duodenal incision over a stone in

the dilated diverticulum of Vater. One case of this kind is reported by Pozzi and one by McBurney.

Internal choledochotomy, division of strictures in the common duct through an opening in the gall-bladder, a successful case of which Abbé has reported, is rarely applicable and is a dangerous procedure, as it is an operation in the dark, and there is grave danger of wounding the vena porta or the hepatic artery. My preference in such cases would be to make an external choledochotomy and then deal with the stricture.

Choledochotomy, the choledocholithotomy of Courvoisier, the excision of the gall-stone from the ductus choledochus, is the operation of choice, which is most commonly indicated, and which effects the most complete cure. This operation was proposed by Langenbuch in 1884. Charles T. Parkes, of Chicago, also spoke of the operation in 1885, and proposed to leave the duct open and drain it by means of a rubber drainage-tube, or to close the opening in the duct by sutures. Kümmel, in 1890, stated that several years before, about the time Langenbuch proposed the operation of cholecystectomy, he had a patient, a woman of forty years, in whom, after having extirpated the gall-bladder, he found a choledochus-stone the size of a walnut in the dilated common duct. He incised the duct, removed the stone, and closed the opening with sutures. The operation was long and severe, and the patient died twenty hours after. (Courvoisier.)

Courvoisier was the first to perform choledocholithotomy. He had made the diagnosis of choledochus-stone, and had planned the operation beforehand. He made the first operation on January 22, 1890; operated on a second patient February 18, 1890, and on a third on March 17, 1890, and all three of these operations were successful.

The remarkable success achieved by Courvoisier immediately secured for choledocholithotomy a place in the front rank of the operations for choledochus-stone.

In 1892 Martig had already collected 27 cases, and in 1895 Mermann collected 17 additional, making a total of 44 cases of choledochotomy, with a mortality of 18 per cent.

Technique of choledocholithotomy. The operation is not always easy and requires at the least one to two hours for its performance. The wound is necessarily deep, and the operating on the duct has to be done at the bottom of the wound. The liver is often swollen and hard, and adhesions are almost always present. Good light is absolutely essential. (Mermann.) I prefer daylight to artificial light. Skilled assistants are necessary, as the liver must be lifted and held up, preferably, by the fingers of an assistant. I prefer this to the method proposed by Studsgaard, who had the liver held up by means of a loop of silk passed through the liver-tissue near the border of the organ. (See Plate III.)

A. *Incision.* An incision of ample length is required in order to secure operating-space, and it is often necessary to supplement the longitudinal lateral incision with a transverse horizontal one. (Czerny.) The peritoneum should then be sutured to the skin.

B. *Adhesions.* After the introduction of large flat sponges, the adhesions between the gall-bladder, stomach, transverse colon, and the greater omentum, which are common, should be separated. These organs, together with the duodenum, are often adherent to the common duct. These adhesions are often band-like and comparatively easy to loosen, either by blunt dissection or by division between ligatures, but they necessarily prolong the operation. In some cases, fortunately rather rare, the duct is found buried in such extensive and firm masses of cicatricial tissue that it is impossible to isolate it or even to find the stone. Thus Körte reports two cases of attempted choledochotomy in which he was unable to isolate the common duct, and could not find the stone. At the autopsy on the first case he found, but not until he had removed the liver from the body and laid it upon the table, a small stone in a parietal dilatation of the common duct. In the second case he tried at the autopsy, first, to find the stone through the wound of operation, but in vain, and it was not until the liver and surrounding organs had been removed and laid upon the table for dissection that he was able to find a stone the size of a bean in the common duct, which was firmly adherent to the surrounding organs.

C. *Examination of the gall-bladder.* After isolation of the gall-bladder from the adherent organs it is usually found to be small, atrophic, and empty; it may even be obliterated, but no reports of this condition are on record. Prof. Frank Billings has, however, told me of two cases when he was present at the operation, in which this condition was found. In rare cases it is found to be dilated. A distended gall-bladder should be emptied by aspiration. When stones are found in the gall-bladder and in the common duct the stones in the former must be removed by cholecystotomy. I think it sufficient to open the gall-bladder only when a stone can be felt through its wall. Czerny (Mermann) considers it necessary to incise the gall-bladder and examine it for stones whether stones can be felt through its wall or not.

D. *Isolation of the common duct.* After loosening the adhesions to the gall-bladder the cystic duct is exposed, and the attempt should now be made to lay bare the anterior surface of the hepatico-duodenal ligament. I have ordinarily found in this locality one or more enlarged lymph-glands. The ligament should now be laid bare downward and to the left until the right border of the duodenum is reached. The free right border of the hepatico-duodenal ligament should now be isolated, and the foramen of Winslow found. The index-finger of the left hand should now be passed upward and to the left in the foramen, whereupon

the contents of the ligament, namely, the vena porta, the common duct, and the hepatic artery, may be palpated between the index-finger and thumb.

E. *Palpation of the stone* is made by searching the duct from behind the duodenum, at about its middle, upward and to the right as far as the hilus of the liver. A floating stone, if present, is felt at the duodenal end or elsewhere in the duct, and often slips away when the attempt is made to engage it between the finger and thumb. It is easy to find the stone again anywhere in the common duct, but when it slips up into the hepatic duct it disappears, and may require considerable manipulation to bring it down into the common duct again. Czerny in Case XX. (reported by Mermann) performed choledochotomy without finding a stone, but removed two stones from the gall-bladder by ideal cholecystotomy. In Case XLI. biliary colic existed for one week five months prior to the operation. The icterus gradually decreased. The patient was emaciated, had lost thirty-six pounds in weight, and was sleepless. On three occasions small gall-stones were found in the feces. The patient was pronouncedly icteric, and the feces acholic. A median incision was made, and the gall-bladder found to be atrophied. During the loosening of adhesions to the greatly dilated hepatic and common ducts a sudden flow of bile occurred, and, as Mermann states, "consequently a tear or an opening in the common duct." The operator felt through the walls a stone, which was easily displaced, and slipped or floated up under the liver. No stone could be found after exploration with the sharp spoon and the forceps, but only old, blackish-green coagula were brought out. (This, I think, was the crushed stone, as in my Case VI. I encountered a small, third stone, which I could feel with the tip of my finger in the wound, but could not dislodge into the wound by manipulation of the hepatico-duodenal ligament.) The operator searched for the choledochus-stone for an hour, but could not find it. The ductus choledochus was sutured and tamponed; on the second day the drain was removed. The operation lasted two hours; the patient was out of bed in three weeks, and in nine months after the operation had gained forty pounds in weight. Mermann remarks: "Where did the stone that disappeared under the palpating finger, and could not be found, although searched for for an hour, go to? It is not clear; it was not found in the feces. It has probably not remained, as the patient recovered, and was well nine months after the operation. The stone was the size of a pea, and could hardly have passed into the gall-bladder, as the calibre of the cystic duct was not sufficient to permit this." My own idea is that the stone was either crushed during palpation between the thumb and finger, or by the sharp spoon, and that the blackish-green coagula were simply the débris of the crushed stone.

The field of operation should now be surrounded by three, four, or five large flat sponges.

F. *Fixation of the stone* at the place of intended incision is made by grasping the stone between the finger and thumb, and holding or pushing it up against the anterior surface of the duct. When the stone is floating, and we are consequently able to select the point of incision into the duct, it should be moved to the anterior surface of the left or lower half of the duct close to the duodenum. When the stone is yellow we can sometimes see it shining through the thin wall of the duct. In order to ascertain whether a stone or a tumor of the duct is present, a needle should be passed in, which will grate upon the stone.

G. *The incision in the duct* should be 1½ to 3 centimetres long, and in the direction of the axis of the duct, over the surface of the stone, which should present in the opening and should then be lifted out. The removal of the stone is ordinarily followed by a flow of bile, from which cultures should always be made. The place of incision in case of floating stone can be chosen, and should be, as I have already pointed out in the anatomy, in the duodenal portion of the duct, to avoid wounding the vena porta.

H. *Exploration of the duct* through the wound in it may be made with the finger; in the majority of cases the duct is sufficiently dilated to admit the little finger. It is my custom to explore in both directions: down behind the duodenum and up into the hepatic duct. By this means a small stone not felt upon external palpation of the hepatico-duodenal ligament may be discovered and extracted.

I. *Extraction of stones.* Stones of the common duct can usually be pushed up into the opening by manipulation and will then slide out, or they may be removed by forceps, or lifted out by sliding a sharp spoon behind them, or may be crushed and the débris removed by the sharp spoon. I have had made for this purpose a sharp spoon with a long, flexible handle, which may be bent in any position for the removal of the stone from the duct.

J. *Sounding* the common and hepatic ducts for stone should be accomplished with a metal probe, which upon touching the stone imparts a grating sensation. For this purpose I employ a silver uterine probe. A stone may also be dislodged by this means from the hepatic duct, as in my Case IV.

K. *Probing* to ascertain if the opening or passage down into the duodenum is free cannot always be accomplished, not because of an obstructing stone or stricture, but because the sound may meet a fold of mucosa in the dilated common duct. As bile passes after the removal of the stone, as we know from the remittence of the obstruction symptoms, any further attempt at opening the passage into the duodenum by means of the probe is unnecessary.

L. *Closure* of the wound in the common duct should be accomplished by a double row of sutures: an inner row through the muscular and external coats of the wall of the duct, but not penetrating the mucosa; and an outer row, including or taking in the peritoneum of the anterior wall of the hepatico-duodenal ligament. I usually leave the sutures long, in order to hold up the wound in the duct during the insertion of the following sutures. The insertion of sutures is easy when the wall of the duct is thickened, but difficult when the wall is thin, as the needle penetrates the mucosa and bile flows through the needle-punctures. The outer row of sutures may stop the flow of bile, but it is sometimes impossible to seal the wound hermetically, however carefully the sutures may be applied. In two of my cases no bile exuded from the wound, but in others, which terminated as favorably, there was a discharge of bile for a limited time—a much shorter time than obtained in the majority of my cases of ordinary cholecystotomy.

M. *Drainage* is accomplished by a rubber drainage-tube passed down to the wound in the duct, and gauze drains inserted one above and the other below the rubber drainage-tube. When the gall-bladder is opened, and instead of being closed is united to the abdominal wall, I drain the gall-bladder by a rubber drain only, and unite the abdominal wall below so as to separate the drains in the gall-bladder and common duct.

Conclusions. 1. In the great majority of cases of stone in the common duct the duct is dilated, and the stone floats in it.

2. Choledochotomy is the operation of choice, and should be employed whenever applicable, as it is far superior to all other methods of operation.

3. Choledochotomy is applicable in the vast majority of cases of stone in the common duct; the cases demanding other operative procedures are rare.

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"THE CROSSED KNEE-JERK."

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The interesting communication on this subject by Drs. Guy Hinsdale and Madison Taylor[1] has been the means of redirecting my attention to the knee-jerk as a subject for further experimental investigation. The phenomenon is of great interest to me, and was the subject of a former paper[2] in which certain experimental results which I had obtained were recorded.

All who have paid any attention to the subject, either experimentally or clinically, must be at one in admitting that such a phenomenon as that known as the "crossed knee-jerk" does occur; but the explanation which has been offered by Drs. Hinsdale and Taylor for its occurrence, though exceedingly ingenious, does not appear to me to meet all the requirements of the case, and the bulk of experimental evidence bearing on the question is opposed to such an explanation.

I do not propose to discuss the question as to whether the knee-jerk is or is not a true reflex; all that I propose to do is to examine the hypothesis advanced by Drs. Hinsdale and Taylor in explanation of the occurrence of the "crossed knee-jerk," to consider the question of reinforcement of the knee-jerk, a point which plays an important part in their paper, and to discuss the mechanism concerned when the knee-jerk returns after a long period of absence. The explanation which they offer with regard to the "crossed knee-jerk" is that "the first effect of the tap on the patellar tendon is a centripetal impulse producing activity of a portion of one cortical motor area, this in turn stimulating the corresponding portion of the other hemisphere and producing thereby a contraction of the adductors of the thigh opposite to the one originally struck." That this explanation is inadequate is, I think, proved by certain experiments which I have performed in order to test the point. The experiments were carried out in the Pathological Laboratory of University College, London, and I take this opportunity of thanking Professor Victor Horsley for his kindness in enabling me to work under such favorable circumstances. Dogs and rabbits were the animals used, but, as the results were practically the same in the two classes of animals, I propose to limit my account to the phenomena as observed in dogs.

Division of the Corpus Callosum. If the "crossed knee-jerk" depends on an impulse passing from the "motor" cortex of one cerebral

[1] Internat. Med. Mag., June, 1895.

[2] Proc. Roy. Soc., 1893.

hemisphere to the other, the most likely path along which such an impulse will travel is the corpus callosum. I, therefore, decided to divide this structure in order to see whether such a procedure would result in abolition of the "crossed knee-jerk." Ether was the anæsthetic used in each instance, and when the animal was under its influence tracheotomy was performed, a glass tube inserted into the proximal end of the trachea, and connected with a funnel by means of an India-rubber tube. The animal was subsequently kept under the influence of the anæsthetic by placing cotton-wool, saturated with ether, under the funnel that was in communication with the trachea-tube, and the animal was killed by an overdose of the anæsthetic at the termination of the experiment. The skull was trephined on one side of the middle line, and the trephine-opening further enlarged by bone-forceps so as to expose a large portion of the cerebral hemisphere on that side, and, extending across the middle line, the upper part of the opposite hemisphere was also exposed. The dura mater was next incised on both sides and raised toward the middle line, so as to expose the underlying hemispheres; these were in their turn carefully separated from each other along the middle line until the corpus callosum was fully exposed, and this structure was then divided along its whole length from before backward. This could sometimes be done without ligating the longitudinal sinus, but in other instances the sinus had to be ligated anteriorly and posteriorly and the intermediate portion removed.

After the corpus callosum was divided the anæsthetic was so regulated that the knee-jerks could be obtained, for, as we are all aware, in deep ether-narcosis the knee-jerks are abolished. I then clamped the India-rubber tube connected with the tube in the trachea and thus induced asphyxia, and with the increased activity of the knee-jerks, which resulted from this procedure,[1] it became possible to elicit, beyond all question, the so-called "crossed knee-jerk:" a blow on one patellar tendon resulting not only in contraction of the extensors of the knee on the same side, but also of the adductors of the thigh on the opposite side.

Such a result appears to me strong evidence against the view that the "crossed knee-jerk" depends on an impulse which has to pass from one cerebral hemisphere to the other, in that the phenomenon could still be elicited after the division of the path along which the impulse would be most likely to travel.

TRANSVERSE SECTION OF THE SPINAL CORD. I next determined to test whether the cerebrum took any part whatever in the production of the crossed knee-jerk. The animal was placed under the influence of ether and kept under the influence of this anæsthetic during the whole

[1] *Cf.* Risien Russell: Proc. Roy. Soc., 1893.

of the subsequent operation. Tracheotomy was not performed. The hair over that part of the back of the animal corresponding to about the mid-dorsal region of the spinal cord was shaved, the skin thoroughly washed, and then well scrubbed with a 1 : 1000 perchloride of mercury lotion. A longitudinal incision was made over the mid-dorsal spines and, all soft parts being cut and scraped away, the spines and laminæ of two vertebræ were removed by means of bone-forceps, the theca opened, and the spinal cord completely divided transversely with a sharp knife.

Warm boiled normal salt-solution was alone employed for washing and sponging out the wound from the moment that the dura mater was incised. The edges of the skin-wound were brought together by means of aseptic horse-hair sutures, and the wound dressed antiseptically.

Such a procedure is followed by well-marked exaggeration of the knee-jerks in the course of a week, and it then becomes possible not only to evoke a crossed jerk, but a greatly exaggerated cross-jerk, so that a tap on one patellar tendon not only evokes clonus in the extensors on that side, but also a powerful contraction of the adductors of the opposite thigh, and even of the extensors of that knee.

Another effect observed, sometimes, which is of interest, was that while a blow on the patellar tendon resulted in the phenomena just described, a similar blow, of the same force, delivered on the distal end of the femur or proximal end of the tibia, resulted in both the crossed phenomena; *i. e.*, the opposite adductors of the thigh and extensors of the knee contracted actively, while there was no response in the extensors of the knee on the side to which the blow was delivered. Further, it was sometimes possible, by repeated blows to the femur on one side, to evoke tonic extension of the opposite limb by contraction of the extensors of the knee, and this without any effect on the knee-jerk on the side whose femur was the recipient of the blows. At other times the same procedure resulted in contraction of the extensors of the knee on the side to which the blow was delivered, as well as of those on the opposite side; but, as a rule, even when this was the case the effect on the opposite side was greater than on the side whose femur received the blow.

The fact that the crossed knee-jerk can be elicited at all, after complete transverse section of the spinal cord above the lumbar enlargement, is proof that any explanation of its occurrence which supposes the necessity of an arc in which the brain is included does not fully meet the requirements of the case, for, with the spinal cord divided transversely in the mid-dorsal region, all chance of influencing the cerebral "motor" centres by the tap on the patellar tendon is out of the question, for no intact path remains by which the afferent or efferent impulse could travel to the brain, or from it to the muscle-group whose contraction results in the phenomenon known as the knee-jerk.

The fact that it is sometimes possible to evoke the crossed knee-jerk

by a blow delivered to the femur, without influencing the knee-jerk on the side to which the blow is delivered, is one difficult of explanation. Had this effect been unilateral[1]—*i. e.*, only obtained, for instance, on the right side when the left side was struck, and not on the left side when the right was struck—then a reasonable explanation might have been offered; but inasmuch as with both limbs in as nearly as possible the same position the effect was obtained irrespectively of which side was the one to which the blow was delivered, a satisfactory explanation is by no means obvious. I prefer to record the fact which I have observed, without offering any explanation of it, for such explanations as suggest themselves to me have too few facts to support them, and therefore they can serve no useful purpose. The phenomenon is of interest when considered in conjunction with Marie's[2] case of syringomyelia, quoted by Drs. Hinsdale and Taylor, in which the left knee-jerk was absent and the right exaggerated, and in which a blow on the left patellar tendon resulted in contraction of the adductors of the opposite thigh, but there was no contraction of the extensors of the knee on the side whose patellar tendon was struck. The effect being a unilateral one in this case admits of a reasonable explanation; but why with all the centres of the lumbar cord intact it should be possible to obtain the effect from either side, as was the case in my experiments, is by no means obvious. The phenomenon is not new to me, however, as I have observed it, clinically, in hemiplegias and paraplegias.

The strongest evidence adduced by Drs. Hinsdale and Taylor in support of their hypothesis with regard to the crossed knee-jerk appears to me to be the fact that they were unable to obtain the phenomenon in cases of cerebral atrophies, idiots, and hemiplegias. These observers state that all cases with the slightest suspicion of exaggerated motor conditions were examined, by which I take it that they mean that the ordinary knee-jerk was increased in all these cases. Without the existence of such increased activity of the ordinary knee-jerk the fact that the crossed knee-jerk was not obtained would not be particularly remarkable; but that it should not be obtained in cases where the ordinary knee-jerk is exaggerated is both remarkable and strong evidence in support of the hypothesis they have advanced.

REINFORCEMENT. Drs. Hinsdale and Taylor are of opinion that "since the knee-jerk is reinforced by voluntary movement in any part of the body, that this reinforcement is due to an irradiation of motor impulse from the active centres to other similar centres, so that they and their related muscles acquire a heightened responsiveness to the external stimuli." Now the strongest objection to this view of rein-

[1] *Cf.* Provost and Waller: Rev. Méd. de la Suisse Romande, 1881

[2] L'Union Médicale, April 17, 1894.

forcement appears to me to be in the fact that any voluntary motor impulse directed to the muscles on whose contraction the knee-jerk depends diminishes the possibility of eliciting the phenomenon, and this, no matter how slight that voluntary motor impulse may be. Then, again, we are all familiar with the fact that in using the Jendràssik method, if a patient is told to interlock the bent fingers of each hand and pull on them, and if he does so very forcibly, he is apt to bring other muscles into play in addition to those actually concerned in the act, and among these the extensors of the knee whose patellar tendon is under observation, a state of things which, instead of increasing the knee-jerk, makes it impossible to evoke the phenomenon.

In common with many neurologists, I believe that the spinal centres are normally under a certain amount of restraint or inhibition exerted on them by cerebral centres, and that so-called reinforcement consists in a lessening of the inhibition, which may be brought about by diverting the patient's attention to some other act. Indeed, I am inclined to go further, and to suppose that the energy expended by cortical centres in restraining the spinal ones is, for the time being, diverted toward the accomplishment of the particular act in question, and that thus the spinal centres are, so to speak, let go. It is clear, I think, that on such an assumption the term reinforcement is a misnomer as applied to the phenomenon in question; more energy is not added to the centres on which the knee-jerk depends, all that happens is that the full amount of energy which exists in these spinal centres is allowed to show itself.

I have satisfied myself that a purely mental process is in itself sufficient to "reinforce" the knee-jerk. If a patient in whom it is difficult, or apparently impossible, to obtain the knee-jerk be asked to make some such calculation as that of adding certain figures together or dividing or multiplying them, and if the patellar tendon be struck when this mental process is going on, the knee-jerk is at once easily obtained and may be quite active. I purposely do not allow the patient to perform even the motor act of writing the result of the calculation as it is being obtained, but tell him to try to remember the figures of the result as he further proceeds with the calculation; this has a still greater "reinforcing" effect on the knee-jerk than when the patient is allowed to write the result; and it is, further, free from the complication of bringing into play the voluntary motor act of writing the figures, which might be claimed as the real cause of the reinforcement.

This view of the nature of so-called reinforcement has more than hypothesis to support it, for that the cerebral centres must exert some controlling or inhibiting influence over the spinal centres is strongly suggested by a consideration of the following facts: Removal of one cerebral hemisphere in an animal—*e. g.*, a dog—results in increased activity of the opposite knee-jerk. So, too, complete transverse section of

the spinal cord at a level high enough not to interfere directly with the lumbar centres results in exaggeration of the knee-jerk in animals.

I am aware that, according to the observations of Bastian[1] chiefly, a complete transverse lesion of the spinal cord in man, above the lumbar enlargement, results in flaccidity of the muscles of the lower extremities and in abolition of the knee-jerks. This is so totally different to what obtains as a result of experimental section of the spinal cord in animals that, without careful microscopic examination of the lumbar cord, in series, together with a microscopic examination of the nerves and muscles on whose integrity the knee-jerks depend, it would be unwise to form too positive an opinion based on the observance of the phenomenon alone.

RETURN OF THE KNEE-JERK AFTER A PERIOD OF ABSENCE. Inasmuch as Kramer's cases[2] of progressive paralysis, complicated by sclerosis of the posterior columns, have been brought forward by Drs. Hinsdale and Taylor in support of their views, it is necessary for me to show how an interpretation in harmony with the views I have expressed may be put on these cases. The point about the cases was that the knee-jerks after being absent returned spontaneously or in association with apoplectiform or epileptiform attacks, to disappear again, or to remain to the time of the patient's death. Now the explanation that I would offer for the spontaneous return of the knee-jerk is that as a result of the progressive cerebral degeneration the inhibition exercised by the cerebral on the spinal centres is gradually removed, so that there comes a time when the spinal centres are so far freed from the restraining influence of the cerebral centres that the few remaining fibres in the posterior columns are sufficient to conduct a stimulus of sufficient intensity to elicit their response, whereas the same stimulus travelling along the same paths was unable to do so formerly because the inhibition exerted by the cerebral on the spinal centres was too great to allow them to respond to it. As regards the temporary return of the knee-jerk on one or other side in association with apoplectiform or epileptiform attacks in such patients, the explanation is practically the same, the only difference being that the progressive cerebral degeneration is not far enough advanced to abolish the inhibitory influence of the cerebral over the spinal centres, but the debilitating effect of an apoplectiform or epileptiform attack is sufficient to reduce the inhibitory influence of the cerebral centres temporarily, and hence the return of the knee-jerk. We are all familiar with the evidence of the debilitating effect which such attacks have on the cerebral centres, as evidenced by the transient attacks of hemiparesis which may be associated with them, and that, without sclerosis of the posterior columns, it is not uncommon to find the knee-jerk on the affected side more active than its fellow.

[1] Med.-Chir. Trans., vol. lxxiii. 1890. Lancet, March, 1890.
[2] Wiener medizinische Presse, 1894, No. 11, p. 424.

In further support of my view of the explanation of the phenomenon observed in Kramer's cases I would cite a case of tabes dorsalis published by Drs. Hughlings-Jackson and James Taylor,[1] and which I had many opportunities of investigating. The case was one in which the knee-jerks were absent as a result of tabes dorsalis, and after an attack of ordinary hemiplegia they both returned, that on the hemiplegic side being always the more active of the two. This case illustrates the intimate relationship which exists between the condition of the pyramidal tracts and the spinal centres concerned with the knee-jerk, and is in keeping with what we habitually see in cases of hemiplegia uncomplicated by sclerosis of the posterior columns, in which both knee-jerks become exaggerated as descending degeneration of the pyramidal tracts becomes established, the increase appearing earlier, and being more marked on the hemiplegic side. This state of things is strictly in accord with the anatomical distribution of the pyramidal tracts as established by the latest experimental researches. It was formerly supposed that fibres from each pyramid were distributed to the crossed pyramidal tracts of the opposite side of the spinal cord, and to the direct pyramidal tract of the same side. The researches of Sherrington led him to suppose that some pyramidal fibres which pass to the crossed pyramidal tract of the opposite side recrossed in the spinal cord so as to reach the crossed pyramidal tract of the same side as the pyramid from which they were originally derived. But more recent researches by Mellus[2] and Sherrington[3] himself have shown that the view with regard to recrossing of the pyramidal fibres in the spinal cord is erroneous, and that what really occurs is as follows: Each pyramid at the decussation in the medulla sends the bulk of its fibres to the crossed pyramidal tract of the opposite side of the spinal cord, a certain proportion to the crossed pyramidal tract of the same side of the cord, and others to the direct pyramidal tract on the same side of the cord. That this is the true distribution of the nerve-fibres derived from one pyramid I have had an excellent opportunity of verifying.[4] A cat, whose central nervous system I examined, had only one pyramid, the other being entirely absent, and from this single pyramid it was the simplest thing possible to trace the nerve-fibres to both crossed pyramidal tracts of the spinal cord. At the decussation in the medulla the bulk of the fibres could be seen passing to the opposite crossed pyramidal tract, while a considerable proportion passed to the crossed pyramidal tract of the same side of the cord. Facts like these make it evident why a lesion of one cerebral hemisphere should be responsible for alteration of both knee-jerks, and not only of that on the hemiplegic side.

The response obtained from the lumbar centres of the spinal cord, in

[1] Brit Med. Journ., July 11, 1891.
[2] Proc. Roy. Soc., 1894.
[3] Lancet, 1894.
[4] Brain, 1895, Part I.

hemiplegia of some duration, as evidenced by the knee-jerk, is as a rule in excess of that met with in the normal condition, but whether this increased response is a measure of the amount of activity which the spinal centres are normally capable of, but which is kept in check by the inhibitory action of the cerebrum, or whether the effect indicates a heightened condition of activity of the spinal centres, induced in some way by the sclerosis of the pyramidal tracts, in excess of what these centres would be capable of if their full normal activity were allowed to show itself after all inhibitory control had been removed from them, is still open to question. The more one considers the subject the more one is forced to the belief that while the taking off of cerebral control is responsible for a good deal of the increased activity that may be seen in the knee-jerk, it is not directly responsible for the great increase of the jerk which is met with after descending degeneration of the pyramidal tracts has been well established. If the mere cutting off of cerebral inhibition were responsible for all the increased activity of the knee-jerk, then the full amount of this activity should be met with soon after the initial lesion; that is, as soon as any depressing influence which shock may have had on the spinal centres and any primary irritative inhibition have passed off. There is one consideration which must not be lost sight of in this connection, however, and that is, that while the process of degeneration is in progress the products of degeneration may keep up a constant inhibitory effect on the cells of the spinal cord, less than that formerly exercised by the cerebral cells, but sufficient to prevent the full effect of the removal of this cerebral influence to show itself. If this be so, then it is easy to see that the full effect can only become evident when all the primary products of degeneration have been removed and sclerosis takes the place of the degenerated fibres. Unless this be the explanation, we are driven to suppose that the full effect of the removal of the cerebral inhibitory influence is apparent as soon as all shock and primary irritative inhibition have passed off, and that any subsequent increase of the knee-jerk, after this period, is due to a heightened activity of the spinal centres, which is induced by, and develops with, the sclerosis of the pyramidal tracts.

THE INFLUENCE OF ALCOHOL AND ALCOHOLIC DRINKS UPON THE CHEMICAL PROCESSES OF DIGESTION.

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(Continued from p. 193.)

Lager Beer (with 1.5 Per Cent. of Alcohol and 7 Per Cent. of Solid Matter).

Experiment 107.

Period of digestion 8 hours.

Beer.	Undigested fibrin.	Proteid digested.	Relative proteolytic action.
0 per cent.	0.5388 gram.	46.2 per cent.	100 0
1 "	0 5596 "	44 1 "	95.4
3 "	0.5769 "	42.4 "	91.7
5 "	0.5817 "	41.9 "	90.7
10 "	0.6147 "	38.6 "	83.5

Experiment 108.

Period of digestion $7\frac{1}{2}$ hours.

Fluid added.	Undigested fibrin.	Proteid digested.	Relative proteolytic action.
0 per cent.	0.3203 gram.	68 0 per cent.	100.0
10 " beer	0.3602 "	64 0 "	94 1
10 " " distillate	0 3487 "	65.2 "	95.8
10 " " residue	0.3480 "	65.2 "	95.8
1 " absol. alcohol	0.3439 "	65 7 "	96.6

Porter (with 3.7 Per Cent. of Alcohol and 4.4 Per Cent. of Solid Matter).

Experiment 109.

Period of digestion $7\frac{3}{4}$ hours.

Porter.	Undigested fibrin.	Proteid digested.	Relative proteolytic action.
0 per cent.	0.5102 gram.	49.0 per cent.	100.0
1 "	0.5095 "	49.1 "	100.2
3 "	0.5104 "	49.0 "	100.0
5 "	0.5267 "	47.4 "	96.7
10 "	0.5834 "	41.7 "	85.1
Absolute alcohol.			
1 per cent.	0.5318 "	46.9 "	95.7

Experiment 110.

Period of digestion $5\frac{7}{12}$ hours.

Fluid added.	Undigested fibrin.	Proteid digested.	Relative proteolytic action.
0 per cent.	0.3919 gram.	60.9 per cent.	100.0
1 " porter	0.4059 "	59.5 "	97.7
10 " "	0.4719 "	52.9 "	86.8
10 " " distillate	0.4071 "	59.3 "	97.3
10 " " residue	0.4163 "	58.4 "	95 8
1 " absol. alcohol	0.4015 "	59.9 "	98.3

BASS'S ALE (WITH 4 PER CENT. OF ALCOHOL AND 4.4 PER CENT. OF SOLID MATTER).

Experiment 111.

Period of digestion $7\frac{7}{12}$ hours.

Ale.	Undigested fibrin.	Proteid digested.	Relative proteolytic action.
0 per cent.	0.4671 gram.	53.3 per cent.	100 0
1 "	0.4624 "	53.8 "	100.9
3 "	0.4949 "	50 6 "	94.9
5 "	0.5160 "	48.4 "	90.8
10 "	0.5311 "	46.9 "	87.9

Experiment 112.

Period of digestion $7\frac{1}{12}$ hours.

Fluid added.	Undigested fibrin.	Proteid digested.	Relative proteolytic action.
0 per cent.	0.3203 gram.	68.0 per cent.	100.0
10 " ale	0.3772 "	62.3 "	91.6
10 " " distillate	0.3386 "	66.2 "	97.3
10 " " residue	0.3684 "	63.2 "	92.9
1 " absol. alcohol	0.3439 "	65.7 "	96 6

The following experiment shows the comparative action of these malt liquors when tested under exactly the same conditions:

Experiment 113.

Period of digestion 5 hours.

Fluid added.	Undigested fibrin.	Proteid digested.	Relative proteolytic action.
0 per cent.	0.3919 gram.	60.9 per cent.	100.0
10 " beer	0.4466 "	55.4 "	90.9
10 " ale	0.4686 "	53.2 "	87.3
10 " porter	0.4719 "	52.9 "	86.8
1 " absol. alcohol	0.4015 "	59.9 "	98.3

From these results it is manifest that the malt liquors, as represented by the above samples, have far less retarding action on trypsin-proteolysis than do wines. This fact, however, is not connected with the smaller

content of alcohol, but rather with the amount and character of the extract or solid matter of the fluid. Thus, lager beer, with only 1.5 per cent. of alcohol, when present in small amount, has a greater retarding action than either porter or ale, although these fluids contain 3–4 per cent. of alcohol. The beer, however, contains nearly twice as much solid matter as the other fluids, and its greater inhibitory power is presumably due to this cause. Small amounts of porter and ale have no noticeable retarding action whatever, but the presence of 5 or 10 per cent. of either of these malt liquors leads to a decided diminution of digestive power.

None of these malt liquors was very strongly acid; thus, the acidity of the ale was only slightly above that of the sample of rum, while the lager beer was considerably less acid. The porter alone was strongly acid, its acidity being nearly half that of the sherry wine. Plainly, the acidity of these malt fluids is not a very important factor in their retarding action on trypsin-proteolysis.

Doubtless, many non-alcoholic beverages have an equally pronounced inhibitory action on the digestive processes, owing to the presence of inorganic salts and other extractives. Tea and coffee, owing to the tannin they contain, are known to exert such an influence, and we may cite the following experiment with ginger ale as an illustration of inhibitory action caused presumably by the extractive matters contained therein:

Experiment 114.

Period of digestion 7 hours.

Ginger ale.	Undigested fibrin.	Proteid digested.	Relative proteolytic action.
0 per cent.	0.3260 gram.	67.4 per cent.	100.0
1 "	0.3553 "	64.5 "	95.7
3 "	0.3574 "	64.3 "	95.4
5 "	0.3562 "	64.4 "	95.5
10 "	0.3866 "	61.4 "	91.0
Absolute alcohol.			
1 per cent.	0.3361 "	66.4 "	98.5

In contrast to this experiment, we report the following results obtained with bottled "soda water"; *i. e.*, water simply charged with carbonic-acid gas, which may be offered as evidence that it is possible to have pancreatic digestion without retardation.

Experiment 115.

Period of digestion 6⅓ hours.

Soda water.	Undigested fibrin.	Proteid digested.	Relative proteolytic action.
0 per cent.	0.4692 gram.	53.1 per cent.	100.0
1 "	0.4695 "	53.1 "	100.0
3 "	0.4675 "	53.3 "	100.3
5 "	0.4690 "	53.1 "	100.0

Comparative Action of Some Alcoholic Liquors on Trypsin-proteolysis.

The comparative action of some of these alcoholic liquors may be seen from the following results which are taken from preceding experiments, where all of the conditions were strictly comparable:

Per cent. of alcoholic fluid in digestive mixture.	Relative proteolytic action.		
	Rum.	Brandy.	Proof-spirits.
0 per cent.	100.0	100.0	100.0
10 "	88.0	89.8	90.5
	Whiskey.	Sherry.	
0 per cent.	100.0	100.0	
10 "	89.1	82.4	
	Claret.	Hochheimer.	
0 per cent.	100.0	100.0	
10 "	65.0	74.0	
	Beer.	Ale.	
0 per cent.	100.0	100.0	
10 "	94.1	91.6	

In concluding this chapter of our subject, we may repeat that distilled alcoholic liquors, such as whiskey, brandy, etc., have a far greater retarding action upon trypsin-proteolysis than upon pepsin-proteolysis. Further, this retardation is not due wholly to the contained alcohol, but is attributable in part to the solid matter present. This latter, however, in a distilled liquor should obviously be very small, and it is quite apparent that if due care is used in the distillation and rectification of such a liquor and no additions are made, the only solid matter should be such as is extracted from the cask in which the liquor is stored. The liquors in question, however, did contain some extractive matter other than tannin, and to this material, as well as to the tannin and the alcohol, the retardation of trypsin-proteolysis is unquestionably due. Wines, with their high acidity and low alcoholic strength, exert a retarding action on tryptic digestion more nearly proportional to the acidity than to the amount of alcohol, or even to their content of solid matter. All three of these elements, however, undoubtedly combine to produce the results recorded. The malt liquors, on the other hand, owe their retarding influence mainly to the large percentage of extractives of various sorts which they contain, the alcohol playing a minor part in the inhibition caused by the fluids of this class.

Salivary Digestion.

In considering the influence of alcoholic beverages on salivary digestion, it is to be remembered that the latter process has for its main object the digestion of the farinaceous foods. This property is shared

in common with the pancreatic juice, the utilization of all farinaceous foods by the body being dependent almost wholly upon the so-called amylolytic power of these two secretions.

Salivary digestion is a comparatively rapid process, the transformation of the insoluble starch into soluble dextrins and sugar taking place in a relatively short period, as contrasted with the proteolytic action of either the gastric or pancreatic juice. Amylaceous or farinaceous foods are exposed to the action of the saliva in the mouth for only a short interval, but the evidence at present available points to the probable continuation of salivary digestion in the stomach for from ten to thirty minutes before the amylolytic ferment is killed by the increasing acidity of the gastric juice. In view of this relatively short period of digestion, retardation of amylolytic action may become a serious matter, since even slight retardation may mean the loss of more or less nutriment to the body. The amylolytic ferment of the pancreatic juice, however, may be able to convert the unchanged starch in the small intestine, providing the influence of the retarding agent does not extend so far. But in any event, retardation or stoppage of salivary digestion must be a serious evil, and it is to be remembered that the amylolytic ferment of the pancreatic juice is closely akin to, if not identical with, the ferment of the saliva, and hence is susceptible to the same influences that affect the salivary ferment.

Methods Employed.

In testing the influence of alcoholic liquors on the salivary digestion of starchy foods the following method was most generally employed: Ten c.c. of a freshly prepared starch-paste (1 per cent.) were introduced into a suitable flask, a given volume of the alcoholic fluid together with sufficient water to make the resultant mixture up to 90 c.c. added; and, lastly, 10 c.c. of neutralized and filtered saliva, which had been previously diluted to some definite volume. The completed mixture was thus composed of 100 c.c. The time at which the saliva was added was carefully noted, and the mixture placed in a suitable water-bath kept at 38°–40° C. In order to measure the rate of digestion a drop of fluid was withdrawn at intervals, placed on a white porcelain surface, and tested with a drop of a dilute iodine-solution. The color obtained with iodine under these conditions is dependent upon the extent of amylolytic action. Thus, the presence of soluble starch, the first product formed, is indicated by a blue color. As digestion proceeds the blue color gives place to a reddish color with iodine, owing to the presence of erythrodextrin, while the final products of amylolytic action, maltose and achroödextrins, give no color whatever with iodine. The time when this so-called "achromic" point is reached is carefully noted, and the

number of minutes required for the appearance of the "achromic" point serves as a measure of the rate of amylolytic action.

A method less frequently used in our experiments, but better adapted to measuring accurately small shades of difference, was as follows: One gram of arrowroot-starch was made into a paste with 40 c.c. of water, 50 c.c. of water alone (in the control) or with the required volume of alcoholic fluid to give the desired percentage were then added; and, lastly, 10 c.c. of a diluted neutral saliva. The mixture, or series of mixtures, was then placed in a bath at 38°–40° C. for thirty minutes, after which the solution was heated to boiling to prevent further action of the enzyme. The resultant solution was then made up to 150 c.c., and the extent of amylolytic action ascertained by determining in one-sixth of the solution the amount of maltose formed by the use of Allihn's[1] gravimetric method. From the amount of reduced copper thus obtained, the amount of maltose was calculated on the basis of Salomon's[2] statement that 100 parts of anhydrous maltose will form 114 parts of reduced copper when boiled with Fehling's solution after the Allihn method.

It is, of course, understood that in both methods all of the mixtures belonging to a given series were treated with the same specimen of saliva.

Absolute Alcohol (99.5 to 100 Per Cent.).

Experiment 116. (Saliva 1 : 15.)[3]

Alcohol.	Appearance of the achromic point.
0 per cent.	7 minutes.
0.5 "	7 "
1.0 "	7 "
2.0 "	7 "
5.0 "	7 "
10.0 "	7 "

Experiment 117. (Saliva 1 : 20.)

Alcohol.	Appearance of the achromic point.
0 per cent.	7 minutes.
1 "	7 "
10 "	7 "

[1] Zeitsch. f. Analyt. Chemie, Band xxii. p. 448.

[2] Journal für Praktische Chemie, Band xxviii. p. 109.

[3] Being the dilution of the saliva added to the digesting mixture; *i. e.*, 1 part of fresh saliva in 15 parts of water. It is to be remembered, however, that in the digestive mixtures (100 c.c.) the dilution of the saliva is increased tenfold.

Experiment 118. (Saliva 1 : 30.)

Alcohol.	Appearance of the achromic point.
0 per cent.	27 minutes.
0.5 "	27 "
1.0 "	27 "
2.0 "	27 "
5.0 "	27 "
10.0 "	25 "

From these results it is plainly manifest that absolute alcohol has very little influence upon the amylolytic or starch-digesting power of neutral saliva. Only when the saliva, added to the digestive mixture, is diluted in the proportion of 1 to 30 does the presence of even 10 per cent. of alcohol have any measurable influence, and then only to retard the appearance of the achromic point two minutes. As this percentage of absolute alcohol is equal to at least 20 per cent. of proof-spirit, it follows that pure alcohol free from admixture is practically without influence upon the digestion of farinaceous foods by the saliva.

A more accurate testing of this question was attempted by the use of the second method above described, with the following results:

Experiment 119. (Saliva 1 : 4.)

Alcohol.	Reduced copper in ¼.	Maltose formed.	Relative amylolytic action.
0 per cent.	0.0885 gram.	31.05 per cent.[1]	100.0
0.5 "	0.0918 "	32.21 "	103.7
1.0 "	0.0908 "	31.86 "	102.6
3.0 "	0.0911 "	31.96 "	102.9
5.0 "	0.0897 "	31.47 "	101.3
10.0 "	0.0862 "	30.25 "	97.4

Experiment 120. (Saliva 1 : 5.)

Alcohol.	Reduced copper in ⅙.	Maltose formed.	Relative amylolytic action.
0 per cent.	0.1436 gram.	75.5 per cent.	100.0
5 "	0.1439 "	75.7 "	100.2
0 "	0.1367 "	71.9 "	95.2
"	0.1309 "	68.0 "	90.0

Experiment 121. (Saliva 1 : 4.)

Alcohol.	Reduced copper in ⅙.	Maltose formed.	Relative amylolytic action.
0 per cent.	0.122 gram.	64.2 per cent.	100.0
5 "	0.120 "	63.1 "	98.2
10 "	0.119 "	62.5 "	97.3
15 "	0.114 "	60.0 "	93.4

[1] Calculated on the 1 gram of starch employed.

Experiment 122. (Saliva 1 : 2.)

Alcohol.	Reduced copper in ½.	Maltose formed.	Relative amylolytic action.
0 per cent.	0.132 gram.	69.4 per cent.	100 0
5 "	0.131 "	68.9 "	99.2
10 "	0.126 "	66.3 "	95.5
15 "	0.125 "	65 7 "	94.6

At first glance, these results would seem to be somewhat opposed to those obtained in the first series of experiments, but such is not the case. The first method simply tells us the time when all the starch has been transformed into achroödextrin and maltose. The second method, however, tells us more than this, viz., the actual amount of *maltose* that has been formed, and as a certain amount of achroödextrin can be transformed into maltose by the continued action of the salivary ferment it follows that this latter method gives us a clearer knowledge of the influence of alcohol upon the secondary action of the amylolytic enzyme. Thus, we find that small amounts of absolute alcohol may actually cause an increased formation of maltose. On the other hand, the presence of 10 or 15 per cent. of absolute alcohol leads to a distinct retardation in the formation of sugar, although the inhibition is not very pronounced considering the amount of alcohol present. This retardation of the secondary action of the ferment is perhaps suggested by the slight delay in the appearance of the achromic point in Experiment 118, in the presence of 10 per cent. of absolute alcohol.

Whiskey (with 50 Per Cent. of Alcohol).

Experiment 123. (Saliva 1 : 30.)

Whiskey.	Appearance of the achromic point.
0 per cent.	28 minutes.
0.5 "	22 hours.
1.0 "	no action beyond erythrodextrin.[1]
2.0 "	no action whatever.[2]
5.0 "	" "

Experiment 124. (Saliva 1 : 25.)

Whiskey.	Appearance of the achromic point.
0 per cent.	6 minutes.
0.5 "	8 "
1.0 "	17 hours.
2.0 "	no action beyond soluble starch.
5.0 "	no action at all.
Absolute alcohol.	
2.5 per cent.	6 minutes.

[1] The final observation was always made at the end of twenty-four hours. [2] Ibid.

Experiment 125. (Saliva 1 : 20.)

Whiskey.	Appearance of the achromic point.
0 per cent.	7 minutes.
0.5 "	8 "
1.0 "	9 "
2.0 "	no action beyond erythrodextrin.
5.0 "	no action whatever.
Absolute alcohol.	
2.5 per cent.	7 minutes.

Experiment 126. (Saliva 1 : 15.)

Whiskey.	Appearance of the achromic point.
0 per cent.	5 minutes.
0.5 "	5 "
1.0 "	7 "
2.0 "	24 hours.
5.0 "	no action whatever.
Absolute alcohol.	
2.5 per cent	5 minutes.

Experiment 127. (Saliva 1 : 7.)

Whiskey.	Appearance of the achromic point.
0 per cent.	3 minutes.
2 "	5 "
5 "	no action beyond erythrodextrin.
10 "	no action whatever.
Absolute alcohol.	
5 per cent.	3 minutes.

Experiment 128. (Saliva 1 : 3.)

Whiskey.	Appearance of the achromic point.
0 per cent.	3 minutes.
5 "	4 "
10 "	24 hours.
Absolute alcohol.	
5 per cent.	3 minutes.

Experiment 129. (Saliva 1 : 4.)

Whiskey.	Reduced copper in ½.	Maltose formed.	Relative amylolytic action.
0 per cent.	0.109 gram.	57.3 per cent.	100.0
5 "	0.110[1] "	57.8 "	100.8
10 "	0.080 "	42.0 "	73 3
15 "	0.010 "	5.2 "	9.0

From these results it is apparent that whiskey may have a very great retarding action upon salivary digestion, the retardation being the more

[1] Allowance being made for the reduction obtained from a corresponding amount of the whiskey alone.

pronounced the greater the dilution of the saliva. When, however, the saliva is diluted only three or four times, so that the proportion of saliva in the digestive mixture is as 1 : 30 or 1 : 40, then the presence of even 5 per cent. of whiskey is wholly without action. It is furthermore apparent that the alcohol of the whiskey plays no part in this inhibitory action. What now is the cause of the retardation? In this connection it is to be remembered that all the whiskies examined by us have shown an acid reaction; furthermore, the saliva used in our experiments was neutralized saliva. Taking into consideration the well-known sensitiveness of the salivary ferment toward acids, the question naturally presents itself whether this retardation of amylolytic action caused by the whiskey is not due to the acidity of the fluid. This question we attempted to answer by the following experiments:

Experiment 130. (Saliva 1 : 15.)

Fluid added.	Appearance of the achromic point.
0 per cent.	4 minutes.
2.0 " whiskey	24 hours.
2.0 " " neutralized	7 minutes.
1.0 " absolute alcohol	4 "

Experiment 131. (Saliva 1 : 25.)

Fluid added.	Appearance of the achromic point.
0 per cent.	9 minutes.
1 " whiskey	24 hours.
1 " " neutralized	22 minutes.
5 " "	no action.
5 " " neutralized	partial action.
10 " " "	" "
2.5 " absolute alcohol	11 minutes.

From these results it is apparent that the retarding action of the whiskey is in great part overcome by neutralization of the liquor, providing the saliva is not too greatly diluted. It is furthermore apparent that with unneutralized saliva—*i. e.*, with the normally alkaline secretion—the retarding action of at least small quantities of whiskey would be far less than is indicated by the above results. Indeed, it may be safely said that with a fair volume of unneutralized, and not too greatly diluted saliva, the presence of even 5 per cent. of whiskey would be practically without action on the salivary digestion of farinaceous foods, a conclusion which Roberts has likewise reached. Obviously, however, the degree of acidity of a given sample of whiskey, together with the natural alkalinity of the saliva, would be important factors in determining the precise character of the result.

In this connection the question may properly be asked why we employed neutralized saliva in our experiments, instead of the normally

alkaline fluid? To this we would answer that in no other way was it possible to obtain constant and comparable conditions, since the alkalinity of the secretion is ever variable, and, moreover, every variation in the dilution of the fluid would obviously cause a corresponding variation in the degree of alkalinity. Further, the best action of saliva is normally obtained when the fluid is neutral, and the natural tendency of the food-stuffs is toward neutralization of the secretion, both in the mouth and in the stomach. Again, since the fluids we were testing all have an acid reaction, it seemed more probable that we should obtain a trustworthy indication of the action of these fluids upon the amylolytic ferment by using a neutral solution of the enzyme.

In conclusion, then, we may repeat that the retardation of amylolytic action caused by large amounts of whiskey is not closely connected with the amount of alcohol the liquor contains, but is more intimately associated with the presence of volatile, acid-reacting bodies; possibly also ethereal bodies, volatile oils, and perhaps also tannin. Hence, the greater the purity of the whiskey, the less will be its retarding action upon the digestion of the farinaceous food-stuffs.

That the solid, non-volatile portions of the whiskey that we experimented with have no retarding action upon the amylolytic power of the saliva is shown by the following experiment made with the residue left on evaporation of the whiskey; an experiment which also shows that the acid-reacting bodies present in the whiskey are volatilized by heat:

Experiment 132. (Saliva 1 : 4.)

Whiskey residue.[1]	Reduced copper in ½.	Maltose formed.	Relative amylolytic action.
0 per cent.	0.091 gram.[2]	47 8 per cent.	100.0
5 "	0.115 "	60.4 "	126 3
10 "	0.113 "	59.4 "	124 2
15 "	0.103 "	54 1 "	113.1

So far as these results go, they indicate that the solid matter present in this sample of whiskey when free from alcohol and the volatile acid-reacting bodies has a marked stimulating action upon salivary digestion. Whether this result may be expected from all whiskies is, of course, uncertain.

[1] The residue dissolved in water. The percentages refer to the residue obtained from those percentages of whiskey.

[2] Deduction being made for the reducing power of the residue itself.

(To be concluded.)

REVIEWS.

THE DEFORMITIES OF THE HUMAN FOOT, WITH THEIR TREATMENT. By W. J. WALSHAM, M.B., C.M. Aberd., F.R.C.S. Eng., Senior Assistant Surgeon, Surgeon in Charge of the Orthopædic Department and Lecturer in Anatomy, St. Bartholomew's Hospital; Surgeon, Metropolitan Hospital; Consulting Surgeon, Hospital for Hip Diseases, Sevenoaks, and Bromley Cottage Hospital; Examiner in Anatomy to the Conjoint Board of the Royal College of Physicians of London and Royal College of Surgeons of England; Corresponding Member of the American Orthopædic Association; Late Examiner in Surgery to the Apothecaries' Society of London; and WILLIAM KENT HUGHES, M.B. Lond., M.B. Melb., M.R.C.S. Eng., L.R.C.P. Lond., Orthopædic Surgeon, St. Vincent's Hospital; Assistant Surgeon, Children's Hospital, Melbourne; Surgical Tutor, Trinity College, Melbourne; Sometime Clinical Assistant in the Orthopædic Department, St. Bartholomew's Hospital; Formerly House Surgeon, Central London Ophthalmic Hospital; and Ophthalmic Assistant, Middlesex Hospital. New York: William Wood & Co., 1895.

As stated in the preface, this work is essentially a record of the present and past experience in the Orthopædic Department of the St. Bartholomew's Hospital. It discusses the causes, pathology, symptoms, and treatment of all the deformities of the human foot, and is written from the standpoint of the general surgeon rather than of the specialist. A very concise description of the normal foot, its anatomy, functions, and changes of form produced by the natural positions and movements, forms the text for the opening chapter. The authors object to considering the bony form of the foot an arch, preferring to call it "an elastic living mechanism," yet fail to show it other than an arched structure controlled by elastic living tissues, and throughout the entire work reference is made to "the arch of the foot."

All forms of club-feet are divided into two classes according to their cause, viz., congenital and acquired, and the authors recognize but five simple or primary varieties, valgus and planus being considered the same. A brief review of the various theories of congenital club-foot is given under Chapter III., the authors regarding the mechanical theory as the most tenable. Under this same chapter are described the degrees of deformities, four divisions being made according to the position of the foot. This is manifestly incorrect, as many seemingly severe cases are very easily corrected, and *vice versa*. A sure method of judging the severity of a case is to ascertain the resistance to correction by the hand offered by the deformed foot. The article on the "Causes of Relapsed and Uncured Cases" is very interesting, the two principal ones being an imperfect cure and neglect of after-treatment.

Chapter IV. includes the pathology, diagnosis, prognosis, and treatment of congenital equino-varus, or, as they prefer to call it, varus. The description of this condition is in many respects detailed, and is taken mostly from one specimen (No. 3510) in the St. Bartholomew's Hospital Museum, and nearly all the illustrations (which are quite numerous) are taken from it. Special attention is directed to the downward inclination of the head of the astragalus in producing equino-varus, and this factor is regarded as one of the greatest obstacles to correction of these malformations. As influencing the prognosis, more stress is laid upon the rigidity of the structures than upon the position of the foot, which, as above stated, would seem the better method of classifying the degree of severity as well as the best guide to the prognosis. The treatment is considered in detail under (1) manipulative, (2) mechanical, (3) operative methods. Great stress is laid upon the use of plaster of Paris as a means of holding the foot in the corrected posture, and the precautions necessary to its proper use are well presented. Under the operative treatment no mention is made of the Anderson method of tendon-elongation, one so admirably adapted to many of these cases and especially to adults with greatly contracted tendo-Achillis. It has been practised extensively in America—in fact, almost to the exclusion of all other methods.

Congenital and Acquired Equinus are described in Chapter VI., and, as the latter form is the one most frequently met with, it is discussed at length. The mildest type of this deformity is a right-angled contraction of the tendo-Achillis, preventing the foot from being dorsi-flexed beyond a right angle to the leg, while in the severer forms the patient walks upon the toes or the distal extremities of the metatarsal bones. Many interesting photographs illustrate the complications which are sometimes seen in this deformity. In paralytic equinus, beside the use of massage and electricity, the application of braces with rubber strips or steel springs to assist or supplant the defective muscles is recommended.

In Chapter VIII., the authors take up equino-varus and equino-valgus, classing them as varieties of equinus and applying the term equino-varus to cases in which the deformity is acquired, while the congenital variety is called varus. This plan renders the subject very confusing, and is inferior to the generally accepted nomenclature, and the book would undoubtedly have gained in clearness had the more common classification been used. The treatment is discussed under the same heads as the other varieties, and presents nothing new.

Calcaneus is divided into three degrees according to the extent to which the foot can be plantar-flexed, and the mechanical theory is again upheld as the most satisfactory explanation of the cause of this condition. Under "Shortening of Tendons" in the operative treatment, Wilson's method, which is an adaptation of Anderson's method of lengthening to shortening, is not mentioned. This form of operation possesses superior advantages over the ones described, in that it gives a definite amount of shortening and leaves the tendon of a uniform thickness, the redundant ends being removed.

Chapter IX. is devoted to the consideration of valgus, which the authors make synonymous with flat-foot or planus, as they "hold that there cannot be flattening of the arch without more or less abduction of the foot," yet there are undoubted cases in which the arch of the foot gives way and flattening occurs, throwing outward the metatarsals and

phalanges, but in which true abduction of the foot does not exist, and the tarsals entering into the formation of the ankle-joint retain the same relation to the tibia and fibula as before relaxation took place, which would not obtain if abduction were present. A specimen in the Mütter Museum, College of Physicians, Philadelphia, admirably illustrates this point. On the other hand, one frequently sees cases of valgus or abduction of the foot without flattening of the foot-sole. This article on flat-foot is, however, an excellent one, and is well illustrated by photographs of cases and specimens. The short reference to the use of the hot-air bath in the treatment of severe grades of flat-foot is of decided value, as this method is comparatively new, and will doubtless prove a valuable addition to orthopædic therapeutics.

In the article on Hallux Valgus the deformity is described as "an outward dislocation or displacement of the great toe at the tarso-metatarsal joint," but should read "at the metatarso-phalangeal joint." This is probably a typographical error, as another such occurs in the article on deformities of the small toes, where the word "metacarpal" is used for "metatarsal." There are but few typographical errors in the book, the print is very distinct, and the numerous illustrations render the subject-matter more clear, though many of them are of rather inferior quality, the outlines and many important points in specimens being poorly shown.

The majority of the references are from authors who wrote twenty or thirty years ago, and many of the latest advances in the treatment of these conditions are not mentioned. Much of the apparatus described is too complicated and unsuited to the use of the general surgeon.

The book does not represent the true position of this branch of orthopædic surgery in this country, but as a department-record it may prove valuable, though it is very voluminous. J. T. R.

HANDBOOK OF THE DIAGNOSIS AND TREATMENT OF SKIN DISEASES. By ARTHUR VAN HARLINGEN, Ph.B. (Yale), M.D., Emeritus Professor of Dermatology in the Philadelphia Polyclinic; Dermatologist to the Howard Hospital. Third edition, pp. 577, enlarged and revised, with sixty illustrations, several of which are in colors. Philadelphia: P. Blakiston, Son & Co., 1895,

THE third edition of this manual is presented to the professional public in an improved and considerably enlarged form. It is slowly, in fact, assuming the dimensions of the larger treatises devoted to the same subject.

Dr. Van Harlingen's *Handbook* has long been esteemed by the class of readers to whom it specially appeals, for the ease with which in it reference may be made to any given subject, for the conciseness and lucidity of the text, and in particular for the exceedingly practical and useful methods of therapeusis for which the previous editions won for it a deserved reputation. Whatever faults it may have are those chargeable chiefly to an alphabetical arrangement of its material and the frequent necessity of compressing the paragraphs devoted to the consideration of an important subject within the compass of a few pages, when a much more elaborate presentation is required in order to give the student

a just conception of the field. If these be faults, they are shared in full measure by the otherwise acceptable encyclopædic treatise by Brocq, which the author of the present manual takes especial occasion to eulogize. In Mr. Malcolm Morris's small handbook of nearly the same size and of similar scope the diseases of the skin are arranged in an order which, if not accordant with the latest advances of pathology, is at least one which does not do such violence to facts as to set land-scurvy next to sebaceous cyst and sarcoma in nearest juxtaposition to scabies!

The truth is, an alphabetical arrangement of diseases is proper only for the encyclopædia, for the dictionary, and for the tables of the statistician. To accept such an arrangement for a scientific work is a confession of weakness. It is less easy for the tyro to search for the chapter on a given disease in an index than to find the name on the top of a right-hand page; but he pays a price for this ease in the resulting and inevitable jumbling of ideas on the subjects which he purposes studying. It is true that the most of manual writers declare that they "refer the reader to the larger treatises for fuller information," but the student in the class-room usually satisfies himself with what is at hand without searching further or more minutely.

One of the conspicuous features of the weakness of an alphabetical arrangement of subjects as distinguished from a scientific system from what is or even an approach to such, is betrayed in the disproportion of the space devoted to different chapters, the sense of such disproportion apparently escaping even the mind of the author. Thus in the small volume before us there are about twenty pages devoted to hypertrichosis, with seven plates representing freaks of nature with respect to hairiness, while ringworm of the beard occupies less than two pages; and lichen planus and ruber together, three. Again, no fewer than nine pages are devoted to "feigned diseases of the skin," while erythrasma (with which the author does not seem to be familiar) is given one-half page; impetigo and impetigo contagiosa together, four; and acquired syphilis of the skin, but seven.

The work as a whole fairly represents the later knowledge had on the subjects discussed. A few errors strike the eye, as, for example, where the disease known in France as *la perlèche* is named in two places "perliche;" and where monilethrix is distorted to "monothrelix." Some of the quotations from the French, as, for example, the foot-note on page 365, are incorrectly reproduced.

Lupus erythematosus is here set down as a form of tuberculosis of the skin, the author thus allying himself with certain English and French writers, though the demonstration of tubercle-bacilli in the disks of erythematous lupus has not yet been satisfactorily accomplished. In the chapter on Cutaneous Tuberculosis, however, the author refers his readers to the varieties of lupus vulgaris as they are described under a separate head, because "they have so long been known by their present name."

It is in the matter of practical usefulness that this small volume excels the other works of its class. Its specific details relative to the treatment of diseases of the skin and its compilation of formulas, some original, others obtained from the best sources, are always satisfactory and in many respects superior to the older works on cutaneous disease, especially those of foreign authorship.

The typography of the work and the illustrations represent a distinct improvement upon the former editions. J. N. H.

OUTLINES OF MATERIA MEDICA AND PHARMACOLOGY. By H. M. BRACKEN, M.D., Professor of Materia Medica, Therapeutics, and Clinical Medicine, University of Minnesota. Pp. v., 383. Philadelphia, P. Blakiston, Son & Co., 1895.

WE have read this book with considerable interest and some curiosity. When a book is presented upon a medical subject which is already treated of by a large number of authors we naturally inquire whether anything new is contained in it, or the old is to be met with in an improved form. And if it is to be used by students, it must be accurate. From these points of view we have read this work, and what have we found? At the outset we must disagree with the author that pharmacognosy has anything to do with the origin of drugs, and that pharmacology is synonymous with pharmaco-dynamics. Pharmacology is a broader term and covers both pharmacognosy and pharmaco-dynamics. After the introduction, which contains nothing unusual save that we are informed (p. 24) that the imperative of *recipio* is *recipi*—the second person singular of the imperative of the third conjugation ending in *i*!—we come to a discussion of the acids, or, rather, of some acids. Quite properly, acids like salicylic are presented under other headings, and oleic might just as well have been included in the list of "Other Acids." About the parts devoted to the metals, non-metallic elements, and the animal kingdom we have little to say; they are fairly well presented, and the average student can read them with profit. The carbon compounds are important, and the student should receive accurate information concerning them. The nomenclature should be that of the *Pharmacopœia*. Butyl-chloral Hydras, the official title, should be substituted for croton chloral (p. 182), a misnomer. The author uses the Greek letter ϕ to indicate remedies which are not official—not a very happy choice, for the same symbol is used by clinicians to denote phthisis. The use of this letter is not always in accordance with the facts; *e. g.*, hypnal and somnal (p. 183) are not official, while oleum theobromatis (p. 240) is pharamcopœial; other instances might be given. It is when we come to the part devoted to the vegetable kingdom that we find the largest field for criticism. First, arrangement: we admit that all systems of classification are more or less unsatisfactory. We are of the opinion that some system is better than none. The student finds (p. 236) cambogia following krameria; the former, if placed with other cathartics and the latter with other astringents, might be fixed in the student-mind as respectively cathartic and astringent. As the matter now stands, we fail to find any reason whatever for the arrangement of this part. An alphabetical order would have been justifiable—and good text-books are to be found arranged in this way—if the author cannot be satisfied with any of the various systems which are in use. But when an important section opens with cimicifuga, followed by hydrastis, berberina, hydrastine, hydrastinæ hydrochloras, pulsatilla, anemonin, adonidine, staphisagria, aconitum, and the rest of the drugs of vegetable origin, taken up without regard to source, uses, physiological or botanical relationship, we may be pardoned if we admire the mental capacity of the student who can reduce the chaos of this part to an orderly knowledge of the action and uses of drugs. The only sem-

blance of arrangement which we can find is, that on pp. 290 *et seq.* and 322 *et seq.* are collected a number of drugs which the author designates as unimportant. We note omissions, as the toxicology of cocaine (p. 242), and one repetition, hæmogallol (pp. 130 and 216). We find opinions contrary to those generally accepted: "lithium salts are practically useless in the treatment of the uric-acid diathesis" (p. 60); when there is a tendency to "heart-failure during the administration of chloroform" inversion of the body should not be practised (p. 169). The nomenclature could be improved by the omission of the final letter in such words as exalgine, stereoptene. There are variations in orthography: chekan and cheken (p. 271); errors of spelling: coccillana for cocillaña (p. 250), hæmotogen for hæmatogen (p. 116). We note indefinite statements: pilocarpine hydrochlorate "may be used in some forms of alopecia" (p. 245); quassia may be used "in some forms of dyspepsia" (p. 249). As examples of careless writing we may cite scoparius. "The action is more fully described under scoparius and sparteine, *q. v.*" (p. 255). "Strophanthus may be used alone or as an alternate with digitalis" (p. 302). "Kino may be used as an astringent, when astringents are required, in diseases of the alimentary canal" (p. 260). The book suggests the notes taken in long-hand of lectures rapidly delivered—it is sketchy. In some places important details are omitted and unimportant ones inserted. Examining the book from the standpoints with which we began this review, we are obliged to say that it does not offer much that is new, the form in which certain parts are presented is not logical, and it contains many inaccuracies. As an outline of Materia Medica and Pharmacology we believe that it deserves the title, but we are very decidedly of the opinion that an unsystematized text-book is not a proper one for students. As to the former, careful revision can readily make it acceptable; as to the latter, not only revision but rearrangement is necessary. The industry which has been displayed in this book leads us to believe that both form and matter will be greatly improved in another edition. R. W. W.

THE DISEASES OF CHILDREN'S TEETH; THEIR PREVENTION AND TREATMENT. By R. DENISON PEDLEY, M.R.C.S., Dental Surgeon to the Evelina Hospital for Sick Children, London. Octavo, pp. 268. J. P. Segg & Co., 1895.

THE author of this volume, a surgeon as well as a dentist, addresses it to medical practitioners and students, feeling, as he says, that in most instances the dental department is neglected in the training of medical men. He emphasizes the value of the teeth in the maintenance of good health, and he endeavors to teach the most important of these points in dental pathology and treatment in children which the medical practitioner should be cognizant of. After a chapter upon the Structure of the Teeth, he discusses their eruption, giving a better illustration of the appearances of the temporary and permanent sets than is commonly seen in most text-books upon children's diseases. His remarks here upon the power of teething in some cases to produce a train of unpleasant symptoms are very pertinent at the present time. The author himself has

no doubt of the connection of these symptoms with dentition. Important, too, are his remarks upon the necessity of being able to distinguish between the temporary molars and the bicuspids, and of keeping a watch over the first permanent molars, which are so often neglected and allowed to decay on the supposition that they belong to the temporary set.

Next come chapters on Caries, Pulpitis, and Periodontitis, and then an extensive one upon Irregularities of the Teeth. This last is abundantly illustrated and includes the treatment of overcrowding of the teeth. Very useful information is given here for those practitioners who are not in localities where dentists can be readily consulted. The chapter upon the Hygiene of the Mouth contains some startling statistics showing the frequency of carious teeth in children, and the relation of this condition to various disorders of health. The final chapter, upon Treatment, discusses the method of examining teeth, the treatment of toothache, and the filling of teeth. The necessary instruments and material are described; the requirements of the medical man rather than those of the dentist being constantly kept in mind.

In conclusion, we cannot better express the favorable impression the book has made upon us than to say that we began the reading of it with the feel ing that it would be useless to us, and finished it feeling that we had gained a great deal of very serviceable information.

J. P. C. G.

MEDICAL AND SURGICAL REPORT OF THE CHILDREN'S HOSPITAL (Boston), 1869-1894. Edited by T. M. ROTCH and HERBERT L. BULLARD, M.D.

IF this handsome volume of 367 pages were an example of hospital reports frequently published in the United States, we could still welcome it with interest and appreciation. Unfortunately, as matters stand, published hospital reports of any sort—apart, of course, from the ordinary yearly one issued by the managers of every institution—are the exception, not the rule. Many foreign hospitals issue printed volumes at frequent intervals, containing very valuable contributions to medical science; while in this country the great mass of hospital practice lies buried in more or less scattered and inaccessible written case-histories. Such a condition is little less than shameful; and we welcome with corresponding pleasure this first report of the Children's Hospital of Boston.

The book contains, as a first volume naturally would, a detailed account of the origin and growth of the hospital; a list of managers and officers from its incipiency to the present time; an account of the system of training nurses followed there; a description of the method of work followed in the surgical wards and in the out-patient department, and other papers of a generally descriptive nature. Besides these there are articles by various members of the hospital staff upon different medical and surgical subjects, all based upon cases occurring in the institution. There are too many of these to do more than point out a few which have interested us especially. Among the medical articles there is a valuable tabular arrangement by Morrill of 42 cases of typhoid fever taken consecutively from the hospital records, with an analysis of the symptoms; a paper on Malaria in Children by Buckingham; one on the Etiology of Chorea, based on a study of 148 cases in the out-patient department,

by Townsend. The surgical division of the volume is particularly rich. The experience of the hospital in Pott's disease and in diseases of the joints, especially of the hip and knee, is described, with numerous reproductions of photographs to illustrate the treatment employed. The paper on Lateral Curvature is good. An excellent tabular arrangement gives the histories of the cases of empyema operated upon. These and a large number of other articles are signed only with the initials of the writers. Besides these we must refer to the Study of Traction in Hip-disease—a scientific paper by Bradford; and to Tenotomy in Spastic Paralysis, by Bullard.

We greatly hope that this, the first "Report," will be followed in coming years by others as valuable as it. J. P. C. G.

EPITOMES OF MODERN SURGICAL PROGRESS—URINARY SURGERY. By E HURRY FENWICK, F.R.C.S. Bristol: John Wright & Co., 1894.

ONLY a word is necessary in calling attention to this *résumé* of genito-urinary surgery. To keep abreast with the progress of modern surgery is beyond the power of any one man. This volume places before one in attractive form for ready reference the recent literature upon this most important department of surgical art. The surgery of the kidney, ureter, bladder, electric cystoscopy, disease of the prostate, seminal vesicles and urethra, with a complete bibliography of the ground covered, form the subjects for consideration. It would be valuable if such a volume could be published every few years, recording the rapid progress made. C. L. S.

PROGRESS
OF
MEDICAL SCIENCE.

THERAPEUTICS.

UNDER THE CHARGE OF

REYNOLD W. WILCOX, M.A., M.D., LL.D.,

PROFESSOR OF CLINICAL MEDICINE AND THERAPEUTICS AT THE NEW YORK POST-GRADUATE MEDICAL SCHOOL AND HOSPITAL; VISITING PHYSICIAN TO ST. MARK'S HOSPITAL.

The Red-light Treatment of Smallpox.

Dr. Niels R. Finsen believes that when the patients come under treatment early enough—before the fourth or fifth day of the disease—suppuration of the vesicles, even in unvaccinated persons, and in cases of confluent smallpox, will be avoided—one exception out of about seventy; as a rule, the secondary fever does not appear, but even when it does the temperature is lower and the fever of shorter duration than is usually the case. As a result of the absence of suppuration the disease becomes of shorter duration and less dangerous, as the greater number of complications do not show themselves; further, the patient escapes pitting. Some authors have observed "minute scars" on the nose and fingers in some few cases; but this only proves that what are generally known as "pock-marks" are done away with. It would seem that children—perhaps on account of their fine epidermis—are more completely exempted from scars than adults. It must, however, be mentioned that this treatment does not prevent the skin becoming hyperæmic where the vesicles have been; the hyperæmia disappears after six to eight weeks, and it is then impossible to see that the person in question has suffered from smallpox. Should the patient come under treatment after the fifth day of the disease, it is uncertain whether the suppuration can be avoided; sometimes this is the case, sometimes not; but it would appear that in such cases the treatment renders the suppuration less severe and less malign. The method is as follows: 1. The exclusion of the chemical rays must be absolute; even a brief exposure to daylight may produce a suppuration and its *sequelæ*. If red window-glass is employed, it must be of a deep red color; and if curtains are used, they must be very thick or in several layers, and thoroughly nailed so that the nurses cannot interfere with the treatment. During meals and physician's visits a faint candlelight may be used without danger. 2. This method does not prevent, but allows

the employment of any other treatment which may be considered necessary. 3. The treatment should be commenced as early as possible; the nearer the commencement of the suppuration the smaller the chance of success. 4. The patient must remain in the red light until the vesicles have dried up.—*The British Medical Journal*, 1895, No. 1823, p. 1413.

The Products of the Thyroid Gland.

Dr. Sigmund Fraenkel names a substance—thyreo-antitoxin—which he believes to represent the active principle of the thyroid gland. He uses a cold-water extract of a weighed quantity of dried sheep's thyroid. The albumins are almost completely precipitated by acetic acid. It is now necessary to determine whether the precipitate, which consists of the albumins, nucleo-albumin, etc., or the filtrate contains the active principles. Experiments on dogs showed that the latter was active. Two control-observations gave the same result. From this filtrate a substance was isolated, very hygroscopic, soluble in water and alcohol, but insoluble in ether. Its aqueous solution is neutral or slightly alkaline. It can be represented by the empirical formula $C_6H_{11}N_3O_5$. The advantages of this substance over the various preparations in taste and odor, in convenience of administration, and in accuracy of dosage are readily understood.—*Wiener klinische Wochenschrift*, 1895, No. 48, S. 842.

Dr. E. Hertoghe has studied the influence of thyroid-products upon growth, noting that after their ingestion by children suffering from congenital or acquired myxœdema, the growth, even if checked for a long time, is now immediately recommenced with energy. At the outset he states that myxœdema in children is little known and imperfectly described; the symptoms may be slight—for instance, the swelling of the hands and feet may be wanting, the psychic symptoms have been notably exaggerated, and the increase of body-weight may be small. The descriptions of the books are based upon exaggerated cases, yet once a case of myxœdema has been seen there is nothing easier than to make a diagnosis. From nine observations he concludes that (1) all have been profoundly influenced by the ingestion of thyroid, having increased in height without regard to the age (6, 14, 18, 27 years) to which they had reached. (2) Their intelligence has expanded. (3) With all, the body-weight has commenced by diminishing, then increased *pari passu* with the gain in height and finally surpassed the initial weight. Taking up the effect of this substance on children who were not the subjects of myxœdema, but whose growth has been retarded, he reports six cases: two of chronic albuminuria, two of rhachitis, one of precocious establishment of menstruation, and finally one of extreme congenital debility. From these he would conclude that under the influence of thyroid they again commence to grow, and some of them very rapidly.—*Bulletin de l'Académie Royale de Médecine de Belgique*, 1895, No. 9, p. 878.

Apolysin.

Drs. Leon von Nencki and Josef van Jaworski have carried out a series of experiments upon animals, themselves and their colleagues, and finally upon a large number of clinical cases. Apolysin resembles phenacetin

in that both contain para-phenetidin, but in the former a citric-acid takes the place of an acetic-acid radical, which replaces the hydrogen-atom in the amide-group of the latter. It is a yellowish-white crystalline powder, having a sour taste and a faint odor, soluble in cold water, more so in hot, in alcohol, and in glycerin. So far as therapeutic effect is dependent upon chemical composition we should expect it to be harmless, and that in the body it would be decomposed into para-amidophenol and para-phenetidin, ethyl, and citric acid, the last being oxidized into carbon dioxide and water. The first two of this series probably depress the temperature, and the ethyl relieves pain. Clinically, the drug was tested in pneumonia, scarlet fever, pyæmia, follicular tonsillitis, erysipelas, hemicrania, sciatica, headaches, neuralgia, and lumbago, generally given alone as a powder, but sometimes combined with the bromides or with caffeine. The general conclusions are that it depresses a febrile temperature, diminishes the pain and hyperæsthesia of neuralgia, causes no unpleasant after-effects, but should not be given upon an empty stomach or in gastric hyperacidity. Since it is very soluble, it is quickly absorbed and its effects appear more rapidly, and because it is not poisonous, large and frequently repeated doses can be administered. The usual dose for adults is from eight to thirty grains *per diem;* three times the latter quantity can be safely administered.—*Allgemeine medicinische Central-Zeitung*, 1895, Nos. 60, S. 709; 61, S. 721; 62, S. 734.

Solanum Carolinense in the Treatment of Epilepsy.

Dr. Charles S. Potts has used this remedy in seventeen cases, obtaining the following results: Five, two of them organic, were not improved. In the remaining twelve, the results showed more or less benefit from the drug. Of the five failures, in four the symptoms were ameliorated by either antipyrin and ammonium bromide or the mixed bromides, and in the remaining case no drug seemed to have any influence. No unpleasant effects were observed, excepting a mild diarrhœa in some cases, which in many epileptics may be more of a benefit than otherwise. The conclusions are as follows: (1) That the drug has a decided influence for good upon the epileptic paroxysm. (2) That this influence is probably not so great nor so sure as that obtained by the use of antipyrin and the bromides, or even of the mixed bromides. (3) That in those cases in which it is of service it relieves the paroxysms without causing other unpleasant symptoms, such as are sometimes caused by the use of large doses of the bromides. (4) That the dose ordinarily recommended is too small, and that as much as a teaspoonful or more four times daily is often needed to secure results.—*Therapeutic Gazette*, 1895, No. 12, p. 798.

The Treatment of Bravais-Jacksonian Epilepsy.

Dr. P. Dignat sums up a study of the application of circular blisters over the course of the aura as follows: (1) Whether these are applied at the point of departure or immediately above, they constitute a more efficacious method of combating certain forms of partial epilepsy. (2) This treatment should be limited to cases of partial epilepsy not due to cranial traumatism, cerebral syphilis, or organic lesion of the nerve-centres. (3) Observations

having demonstrated that this medication succeeds when other methods, more commonly employed, have failed, it should have the preference. (4) Finally, this method, being absolutely harmless, should be tried before all the others, so that the patient will be protected against certain accidents which are always possible with other methods—for instance, the use of the bromides.—*Bulletin Général de Thérapeutique*, 1895, 44e liv., p. 456.

The Treatment of Periodic Headache by Ergot.

Dott. Luigi Cappellari reports three cases treated with large doses of the fluid extract of this drug. These were chronic cases, and had proved to be rebellious to the ordinary remedies. To this elixir of quinine was added to overcome the nauseous taste. Nausea and vomiting were likely to occur if equal parts of each drug were given, so that it would be necessary to resort to enemata. This was obviated by making the proportion as follows: One drachm of the fluid extract of ergot with three drachms of elixir of quinine. —*La Riforma Medica*, 1895, No. 241, p. 191.

The Treatment of Toxic Dyspnœa.

Dr. H. Huchard contends that this dyspnœa is not uræmic, but it can be brought about by an animal diet, and, on the other hand, he has readily made it to disappear by placing the patient upon an exclusively milk-diet. Thus do we find the reason for terming this dyspnœa toxic as originating from ptomaïnes. Three different types can be distinguished: (1) Renal, characterized by a slight albuminuria and a cardiac *bruit de galop*, and high arterial tension. (2) Cardiac, by cardio-sclerosis, arhythmia, aortic dilatation, and even mitral murmurs. (3) Aortic, by various aortic lesions (chronic aortitis, insufficiency, sometimes angina). The matters for consideration are: (1) For fifteen days an exclusively milk-diet (three to four quarts daily). (2) Then twice each month for five days, one-half to two quarts of milk daily, vegetables of all sorts, some eggs, fruits, grapes, meat in small quantity, once each day, at midday, during the days preceding the series of exclusively milk-diet. (3) Avoid at all times soups, fatty broths in excess, salt, and made-over dishes, fish, cheese, preserves, tea, liquors, wine, and tobacco. (4) An occasional purgative, 10 grains of calomel and resin of scammony, in two cachets. (5) On the second day of the exclusively milk-diet and for three or four days six cachets, each containing eight grains of theobromine, and this increased to a daily dose of sixty to seventy grains. (6) During the mixed *règime* twice daily a dessertspoonful of a 1 per cent. solution of sodium iodide. Of course, this dyspnœa should not be mistaken for that of acute pulmonary œdema, which is a frequent and formidable complication of cardiac lesions which are secondary to those of the arteries.—*Journal des Praticiens*, 1895, 2e Semestre, No. 22, p. 342.

The Cutaneous Accidents of Sero-therapy.

Dr. E. Maragliano reports that following injections of serum, in the treatment of tuberculosis, various cutaneous manifestations have been observed: Transient erythema, outbreaks of urticaria and phlegmnous

infiltrations of subcutaneous connective tissue. Obviously, these could be caused by the injection of the serum *per se*, independent of the antitoxin which it contained or by the serum which contains antitoxin. So far as concerns the first, Héricourt pointed out that in the transfusion of the blood of animals to man there was noticed the readiness with which urticaria was produced. In this instance it was the subcutaneous injection of dog-serum in the treatment of tuberculosis, although the dog had not been vaccinated or inoculated in any way. Similar observations were made by Vidal. Legendre reported that horse-serum caused an erythematous eruption each time that it was injected into a man. Frequently, on the argument of *post hoc ergo propter hoc*, various manifestations have been attributed to the serum. Three hypotheses are possible, that these disturbances depend upon a special exciting action of the serum, or to a personal susceptibility of the individual, or to a combination of these two conditions. Héricourt noted that the serum from some dogs was of double the toxic power of others. Further, it has been shown that a serum which could be used upon a considerable number of individuals without injury may cause accidents when used upon a particular one. Probably the third hypothesis is the most probable, and the personal factor of most importance is the vulnerability of the tissues. In case of these manifestations it is well to suspend the injection, recommencing after four or five days. If the quantity employed was more than fifteen drops, it should be reduced to that amount and injected only once in two days. He concludes that the cutaneous disturbances consequent to injections of antituberculosis-serum are those common to injection, whether of normal or medicinal serum. They are not of importance only when, by their persistence, they make it necessary to suspend the treatment.—*Gazzetta degli Ospedali e delle Cliniche*, 1895, No. 147, p. 1537.

The Paquin Antitubercle-serum.

Dr. L. L. Shropshire reports briefly five cases, and states that in the twenty-five treated all have improved, some very materially, and others not so much. In these cases he acknowledges the aid which the climate of Southwestern Texas has given him. On the other hand, the results achieved by the originators of the treatment, Lemon, Tuholsky, and Simpson, in a damp, cold, and unfavorable climate lead to a belief in the obtaining of greater success in a more suitable climate.—*New York Medical Journal*, 1896, No. 892, p. 15.

The Subcutaneous Use of Creosote and Guaiacol in Pulmonary Phthisis.

Dr. F. R. Walters briefly reviews the literature and gives his own results in six or eight cases. He uses solutions, in sterilized and purified oil, of creosote, 1 (French) and 2 (English), 1 in 15; of guaiacol 3 (French), 1 in 5. The injections were made from once to three times a week, and the usual daily dose was from 10 to 15 minims of the substances. The syringe was furnished with an asbestos-piston, and could be readily sterilized. The largest dose of creosote was 20 minims, and of guaiacol 33 minims. The local effects were slight burning at the site of injection, which usually soon

passed off unless the injection was made where the skin was tight. A swelling was left, which felt hard and indurated, the induration passing off, as a rule, in about a week, but sometimes lasting longer, but there was usually no pain nor inflammation afterward. There was no complaint of tasting the creosote directly after injection. In one case there was slight collapse after the first injection of 20 minims of the 1 to 15 creosote solution; the same patient subsequently readily stood drachm doses. In one case the appetite greatly improved, the lung-trouble nearly disappeared, the cough disappeared, and the weight was increased and the patient remained in good health. In another the lung-trouble had increased, but much more slowly than was to be expected, while the general health remains exceptionally good. The two others of the four, whose histories were carefully kept, have not been long enough under observation for definite opinions. The treatment seems to be well borne, and may be useful when other methods fail. The doses should be very cautiously increased, and the treatment should be long continued, but it should not be tried when the kidneys are unsound, nor when there is a large area of inflamed lung, nor decided signs of intolerance. 1 in 5 guaiacol seems to be as well borne as 1 in 15 creosote solution, nor does it seem to be inferior.—*British Medical Journal*, 1895, No. 1824, p. 1488.

Creosoted Morrhuol.

Dr. Joseph Lafage considers beechwood-creosote to have an elective action upon the lung and directly combating the diseases and especially their causes; it should be termed a specific medicament. Morrhuol, on the other hand, is an excellent solvent of creosote. The combination then—the morrhuol—acts as a reconstituent and preventive of waste of the first rank, acting especially upon the respiratory passages, and—the creosote—a powerful disinfectant, antiseptic, and parasiticide, and acting not only upon the respiratory, but as well upon the digesitive system. Six to eight grains of this mixture can be taken each day without inconvenience and with benefit to the patient. It has found its principal use in pulmonary tuberculosis, but it is equally valuable in chronic catarrhal bronchitis.—*La Médecine Moderne*, 1895, No. 98, p. 759.

[The author ignores the abominable taste and odor of the preparation, and that the burden of proof that morrhuol represents the valuable properties of cod-liver oil devolves upon those who advance the claim.—R. W. W.]

The Laborde Method of Artificial Respiration.

Dr. Edward Martin, taking as a text the statement "that respiratory movements which had ceased from asphyxia or other cause, life not being extinct, could be restored by rhythmical traction exerted upon the tongue," presents a careful study of the subject, reporting seven instances of its use. Laboratory-experiments upon animals and clinical tests seem to show beyond controversy that when but one method of artificial respiration can be adopted, as in the case of a single helper in charge of an asphyxiated patient the Laborde method is pre-eminently the best. Indeed, any form of artificial respiration, unless the tongue is drawn well forward, is unsuccessful.

When more than one helper is at hand this method should be supplemented by the Sylvester movements; *i. e.*, traction during inspiratory movements of the arms, relaxation during expiratory movements. Because of its ease of application and its efficiency, the Laborde method should be taught as the first and most efficient means of resuscitating the apparently dead.—*Therapeutic Gazette*, 1895, No. 12, p. 793.

The Treatment of Grippal Pneumonia by Large Doses of Pilocarpine.

Dr. Poulet uses five-sixths of a grain of pilocarpine hydrochlorate—less for children—in all cases, even of old patients, several of whom were over seventy years. Generally two such doses in two days are sufficient, but occasionally the third dose may be necessary on the following day. Then the cure is completed by the use of ammonium acetate in solution. He reports but four deaths among one hundred and eight pneumonias.—*Les Nouveaux Remèdes*, 1895, No. 22, p. 507.

Stypticin in Uterine Hemorrhage.

Dr. Sigmund Gottschalk states that this substance, which is cotarnin hydrochloride, is obtained from narcotine, the well-known alkaloid of opium. Narcotine, when oxidized, as was shown by Wöhler, breaks up into opianic acid and cotarnin ($C_{11}H_{12}NO_3(O.CH_3) = C_{12}H_{15}NO_4$), the latter bearing a close resemblance in chemical formula to hydrastinine ($C_{11}H_{13}NO_3$). Cotarnin hydrochloride is an amorphous, sulphur-yellow powder, giving with water a straw-yellow color, which becomes darker on exposure to the light. Internally, this powder can be given in powder or capsules in five-sixths of a grain dose, five or six times daily. Hypodermatically three grains can be injected into the gluteal muscles if hemorrhage is profuse. Besides its hæmostatic properties it seems also to relieve pain, soothes the patient, and even to be conducive to sleep; these properties being very advantageous in dysmenorrhœic conditions. Fifty-seven cases of uterine hemorrhage from various causes are reported in which the use of this remedy yielded good results.—*Therapeutische Monatshefte*, 1895, Heft 12, S. 646.

The Treatment of Osteomalacia.

Dr. Guillaume Rossier mentions as a remedy, phosphorus in doses from one sixty-fourth to one-sixteenth of a grain, but if this does not result in benefit then castration is to be considered. The brilliant results which have been obtained by the use of bone-marrow in certain blood-diseases suggest from the standpoint of the changes in the blood and in bones in this disease that here also benefit could be obtained.—*Therapeutische Monatshefte*, 1895, Heft 12, S. 653.

A Preparation of Milk for Diabetic Patients.

Dr. Sydney Ringer adds to a pint and a half of milk about three ounces of a 10 per cent. solution of acetic acid. This precipitates a curd, caseinogen. It should be allowed to settle, and the clear fluid siphoned off and distilled

water added. After settling this should be filtered and well washed with distilled water. If it is then well rubbed up in a mortar with some calcium carbonate, and water is added and all the caseinogen becomes dissolved, the calcium carbonate soon settles, and the milky fluid can be decanted off. The dissolved caseinogen behaves just like milk. If rennet and a calcium salt is added and the mixture is heated to 104° F., it quickly clots, the caseinogen becomes changed into casein, which precipitates by combining with the calcium salts. Later experiments show that the caseinogen settles better after the addition of the acetic acid if the milk is diluted with an equal quantity of water, and, further, it is filtered and the precipitate is washed on a calico filter, which permits of more rapid manufacture than if a paper filter is used. This solution is milk without the milk-sugar. If 2 per cent. of glycerin is added, a not unpalatable form of milk is produced.—*British Medical Journal*, 1895, No. 1823, p. 1412.

Guaiacol-anæsthesia.

Dr. Lucas Championnère has obtained local anæsthesia by the subcutaneous injection of fifteen minims of a 5 or 10 per cent. solution of guaiacol in oil. The first experiments were made by Marin in dental surgery; the results were superior to those of cocaine. Anæsthesia is obtained in about ten minutes. The method has also been employed for the ablation of wens and for incision of phlegmons.—*Bulletin Général de Thérapeutique*, 1895, 46e liv., p. 518.

Albuminuria Consecutive to Chloroform-inhalation.

Dr. Patein has made seventy-six observations, each one comprising specimens taken before anæsthesia, during anæsthesia but before the operation, and after recovery from the anæsthetic. Albuminuria was found before anæsthesia in 12 per cent., during anæsthesia but before the operation in 35 per cent., and after the operation in 73 per cent. of these cases. This albuminuria disappears generally by the end of two or three days, is not proportional to the duration of the anæsthesia, and appears to depend solely upon the chloroform. With patients who are already albuminuric, the quantity of albumin may be increased, but this is not generally, nor is there any fixed rule. The kidneys do not undergo any serious alteration, the uric acid and chlorides are generally more abundant, but there appears to be nothing more than a passage of serum-albumin at the glomerulus.—*Journal des Praticiens*, 1895, 2e Semestre, No. 24, p. 378.

The Action of Beta-naphtol and Bismuth Subnitrate as Intestinal Antiseptics.

Drs. N. Surveyor and Vaughan Harley undertook to determine definitely the real value of the former drug. The chemical experiments consisted in estimating the amount and ratio of alkaline and aromatic sulphates present in urine of man before, during, and after taking either of the drugs separately or together. The amount of urea was also estimated at the same time to see how far the body was kept on nitrogen equilibrium. The method

of administration was always *per os* in the form of powders. In the first series of experiments with beta-naphtol, during one week the normal ratio of the sulphates was obtained, then the drug was administered in fifteen-grain doses at breakfast and dinner for twelve days. The day and night urine were collected separately. The second series lasted thirty-seven days. The first day's urine was tested for the normal ratio. On the succeeding seven days seven and one-half grains of bismuth subnitrate were taken twice daily, at breakfast and dinner. During the next week fifteen grains were taken thrice daily, at breakfast, lunch, and dinner. During the next four days fifteen grains of beta-naphtol in the morning and evening, with bismuth subnitrate, which was continued in fifteen-grain doses thrice daily. The general result of these experiments was to show an increase of aromatic sulphates during the time when the beta-naphtol was taken either alone or with bismuth subnitrate. The total sulphates did not vary much during the same period as compared with the normal periods. On the other hand, the alkaline sulphates were always diminished under the influence of beta-naphtol. The general health remained the same during these periods except that on the last day of bismuth subnitrate and beta-naphtol griping and slight looseness of the bowels occurred; beta-naphtol also appeared in the urine. It is not possible to say how far the latter drug serves to diminish the aromatic sulphates, because that is most probably masked by the drug itself, which is excreted as an aromatic sulphate at the expense of the alkaline sulphates. The bacteriological observations consisted of the ordinary test-tube experiments, and these show that both drugs have the power of preventing or hindering the growth of micro-organisms; that beta-naphtol is the stronger of the two, in some cases. The safest dose for the latter is about 8, for the former 10, in 10,000. To ascertain how far these drugs would act as intestinal antiseptics the determination of the approximate number of colonies present in the contents of the different parts of the alimentary canal of dogs, after feeding them for several days on the same kind of food, was undertaken. Dogs which were treated with both drugs showed considerable reduction of the colonies throughout the whole tract. Simple beta-naphtol showed a similar reduction. The bismuth subnitrate produced a reduction in the number in the upper, but hardly reduced it in the lower part of the tract. A further set of experiments were carried out by taking diluted contents of the large intestine of dogs and adding the drugs either singly or together, and leaving them in an incubator at body-heat. These showed that bismuth subnitrate is more powerful as a germicide than beta-naphtol, when large doses are used. However, internally beta-naphtol appears to act better than bismuth subnitrate. The reason for this discrepancy is that although the latter is the stronger antiseptic, its value is lowered on account of its constipating property.—*British Medical Journal*, 1895, No. 1824, p. 1483.

The Disadvantages of Lactophenin.

Dr. Hermann Strauss reports three instances of catarrhal icterus, accompanied with stools which were free from bile, during the administration of this drug. Hitherto few unpleasant symptoms have been recorded. Naturally perspiration has been noticed, but severe disturbances on the

part of the heart have not been reported. Two cases of exanthemata from the remedy have already been observed by the author. The dose employed was 15 grains four times daily. The colorless stools persisted several days in two cases, but in the third for seven weeks. In every case the commencement of the jaundice was accompanied by characteristic dyspeptic symptoms. Taking these instances in connection with experiments on rabbits, when gastric congestion and marked duodenal injection were noted, it is quite likely that there is a connection between the administration of the drug and the appearance of the icterus. How the drug brings about these conditions is not easy to answer.—*Therapeutische Monatshefte*, 1895, Heft 9, S. 469.

Petroleum-poisoning.

Dr. Cheves Bevill reports a single case of a child, two and one-half years old who had drank some coal-oil. The symptoms noticed were stupor, pupils somewhat contracted, nystagmus, cold extremities, rapid pulse and respirations, and subnormal temperature. There were marked gastric irritations, difficulty of swallowing, slight suppression of urine, which later was shown to be albuminous. The throat was exceedingly red and appeared as if it were scalded. Recovery took place after twenty-four hours.—*Therapeutic Gazette*, 1895, No. 9, p. 604.

Exercise and Food for Pulmonary Invalids.

Dr. Charles Denison discusses various exercises which are intended to develop and to preserve the chest in health, and also presents the method of administration of food and its scope in the treatment of pulmonary invalids. With marked preference for nitrogenous food-stuffs, the arguments are brought forward fairly. A brief daily dietary is of practical value. Although nothing new is offered, the style in which this little book is written gives it a field of usefulness.

Formulary of Pharmaceutical Specialties.

This very useful book by Dr. M. Gautier and M. F. Renault takes up the composition, therapeutic indications, method of use, and the doses of various special preparations, and is intended for the use of physicians. In it we find many formulas, a considerable amount of information concerning the practical application of various wines, syrups, granules, tinctures, and pills more or less employed in this country. For instance, under colchicum we find the anti-gout wines of Anduson, the anti-gout pills of Lastigue, and the granules of colchicum of Houdé. We would criticise especially the indefiniteness of the composition of many, perhaps of most, preparations. Injection Brou is stated to be "prepared according to the formula of the Midi Hospital." "Élixir Virenque contains cocaine, pepsin, and diastase." If one has confidence in the dosage of the manufacturer, perhaps he may be content to be ignorant of the amount of each drug employed in the preparation. Yet the book will be useful for reference because it gives in a convenient form and in a general way the constituents of many preparations which bear the name of the originator.

The brief second part is a therapeutic index, in which these preparations are cited by name. The third part gives alphabetically these special preparations, and, lastly, the names and addresses of the manufacturers. The work will be of value chiefly to those who read French medical literature, although many of the titles are to be found in American and British journals and text-books.

The Treatment of Anterior Urethritis.

Dr. Ramon Guitéras treats his cases as follows: As a diluent, potassium acetate fifteen grains three times daily, then an astringent, hand-injection three times daily, of carbolic acid, alum, and zinc sulphate, of each five grains; glycerin, half an ounce; and distilled water, four ounces. On the first day at noon, after the patient has urinated, wash out the urethra with warm water and inject two drachms of one grain to the ounce silver nitrate solution, allowing it to escape immediately, and then wash out the urethra with a saturated solution of boric acid. On the second day use a two grains to the ounce solution, and increase the strength of the silver solution, each day, by one grain until the discharge has been stopped, or reduced to a slight moisture about the meatus, which condition is usually arrived at about the eighth day. This treatment should not be continued beyond the tenth day, when a ten grains to the ounce solution is given if necessary. After this the astringent hand-injections and diluents are kept up for a few days, and if some discharge still exists the silver solution may in some cases be continued, diminishing the strength by one grain to the ounce each day.—*Therapeutic Gazette*, 1895, No. 11, p. 721.

The Use of Cantharides in Albuminuria.

M. du Cazel calls attention to the observation of Lancereaux, made in 1892, concerning the benefit to be derived from the use of cantharides in albuminuria. Five cases are reported, four of which were completely cured by the use of the tincture, in doses of from four to twenty drops, while the fifth was considerably relieved. Of these cases, three were suffering from acute nephritis resulting from some ill-defined cause, perhaps *a frigore;* the fourth was consecutive to a pneumonia treated by cold water. The cases, reported in detail, seem to warrant the conclusions of the author.—*Gazette Hebdomadaire de Médecine et de Chirurgie*, 1895, No. 43, p. 508.

The Treatment of the Lightning-pains of Tabes.

Dr. Blondel reports that a syphilitic tabetic was cured of unendurable and obstinate lightning-pains in the following manner: He lay upon his bed, drew his thighs upon his abdomen, and bent his legs so that the knees and chin were brought together. Then a strap was passed around his neck and popliteal spaces, tightened, and fastened by the patient himself, who remained in ball-like position for five minutes, After eight days of this treatment the pains disappeared, Upon their return the method was repeated once each month. For two years the pains have been absent. This procedure, the result of which is to lengthen the spinal cord, does not present the danger

of luxation of the cervical vertebræ and does not require an especial apparatus.—*Therapeutische Monatshefte*, 1895, Heft 10, S. 566.

The Toxins of Erysipelas and Bacillus Prodigiosus.

Dr. Norval H. Pierce reports the results of treatment of two cases of sarcoma involving structures within the nasal cavity. The first, myxosarcoma beginning in the middle turbinated body, received in all two drachms of the toxin in three months; the last injection being unusually large, severe reaction occurred, so that further treatment was refused. Later the upper jaw was removed and the patient was *in extremis* from extensive recurrence. The second was one of post-nasal fibrosarcoma. Nearly one drachm of the toxin was used, but the growth increased in size. The superior maxilla was cut away and the tumor removed, death resulting within twenty-four hours. These cases are reported as undoubted and complete failures with the antitoxins used in sarcomata. Whether the different results of different observers are due to difference in the toxins used, one cannot say. In these cases five specimens were employed from as many different lots, and they all gave uniformly negative results.—*Chicago Medical Recorder*, 1895, No. 1, p. 23.

Lycetal.

Dr. W. E. Anthony claims that this drug, which is dimethyl-piperazine tartrate, possesses advantages, as a solvent of uric acid, over the alkaline salts of lithium, sodium, and potassium in its power of dissolving not only the outer layers of uric acid, but in disintegrating and removing the albuminous nucleus. It is more diuretic than is piperazine, because the tartaric acid in the system is converted into a carbonate and renders the blood more alkaline. The amount employed is from fifteen to forty-five grains in aqueous solution, which is of an agreeable acid taste, and its prolonged use does not excite repugnance. Six cases are briefly reported.—*New England Medical Monthly*, 1895, No. 9, p. 417.

Urotropin.

Dr. Arthur Nicolaier reports that this drug, which is known chemically as hexamethylentetramin, is formed by the union of formaldehyde and ammonia, and can be used in adults in doses to ninety grains daily without unpleasant results. Diuresis is increased, the uric acid and sedimentous urates no longer appear. It is further found to be especially adapted for the treatment of uric-acid calculi, dissolving them, but only until the drug is all excreted. The amount usually employed is fifteen to twenty-two grains, taken at one dose, in the morning, dissolved in water. While the patients are taking this drug the urine remains clear and retains its acid reaction at the body-temperature, even if a few drops of urine in a state of ammoniacal fermentation were added to it; even after inoculation with pure cultures of the bacterium coli commune, urine remained sterile at blood-heat. From this observation it was suggested that the drug would be of use in preventing the development of micro-organisms, such as the bacteria of ammoniacal decomposition and the bacterium coli commune, which latter, as is well known,

is a factor in many of the bacterial diseases of the urinary passage. Two instances are cited in which substantiation is found for this belief. For this purpose seven to twenty-two grains per day are required.—*Deutsche medicinische Wochenschrift*, 1895, No. 34, S. 541.

Saline Baths in Graves's Disease.

Dr. Claude Wilson reports a single instance in which marked symptoms were found. [The saline baths (Schott method) have already been noticed in this Journal, 1895, No. 274, p. 205.] The rules to be observed are: (1) Begin with weak baths free from carbonic acid and slightly below blood-heat. (2) Gradually increase the strength and duration and lower the temperature. (3) Add free carbonic acid to the stronger bath. (4) Lie down for an hour after each bath. (5) Never give baths for more than four consecutive days without an interval. With the exception of the third and fifth, these rules were adhered to in the case reported. The improvement was very marked.—*The Practitioner*, 1895, No. 327, p. 227.

The Therapeutic Action of Hot Sulpho-saline Waters.

Dr. Lewis R. Morris, from his personal observations made at Glenwood Springs, Colorado, concludes that the beneficial results are brought about by the effect on the system of several factors. These, he believes, are: (1) The pure air and high altitude, which increase the elimination of carbon dioxide and the oxidation of the blood and the number of respirations per minute. (2) The marked diaphoretic action on the skin, relieving the work of the kidneys and eliminating the waste materials from the blood resulting from the condensation of the cyan-alcohols. (3) The action on the liver from drinking the water, increasing the excretion of bile. (4) The correction of the catarrhal condition of the stomach and intestines, increasing the appetite and assimilation of food. (5) The increased action of the circulation and the absorbent system. (6) The evident soothing effect on the nervous system of the vapor-caves in an excited or inflamed condition of the nerves and the stimulating effect upon a general nervous depression. (7) Probably in no disease are these waters specific unless it be lead-poisoning.—*New York Medical Journal*, 1895, No. 878, p. 393.

Distilled Extract of Witch-hazel.

Dr. W. D. Hoeffken seeks to ascertain to what the merits of this preparation should be ascribed. Following the directions for the preparation of the aqua hamamelidis of the National Formulary a product is obtained which contains 15 per cent. of 94 per cent. alcohol, together with such substances as are dissolved from the leaves, etc., during the process of maceration and distillation. All investigations hitherto directed toward the discovery of any active principle possessing the wonderful healing properties ascribed to the extract of witch-hazel have been barren of results, unless we except a small quantity of volatile oil, to which the peculiar odor is due, and the alcohol which has been added as a preservative. The

conclusion is inevitable that the only active principle is the added alcohol. Of seventeen samples of various makes which were analyzed the volume-percentage of alcohol varied from 8 to 12.79. In all cases the acid reaction was due to the presence of a small quantity of acetic acid. Distilled extract of witch-hazel is nothing more or less than a highly diluted alcohol, containing traces of valueless extractive matter and a small quantity of a volatile oil to which its peculiar and agreeable odor is due.—*Bulletin of Pharmacy*, 1895, No. 9, p. 393.

MEDICINE.

UNDER THE CHARGE OF

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Spastic Paraplegia.

Dejerine and Sottas report an interesting case which they think demonstrates the possibility of a spastic paraplegia due to primary lesion of the lateral columns.

The patient was a man, aged sixty-two years, with no previous history of syphilis, but with a history of moderate alcoholism and of rheumatism. At the age of forty-two he was attacked with a passing feebleness of the lower limbs. After a short time loss of power of the legs gradually returned, accompanied by slight lancinating pains; the loss of power gradually increased. The patient was under the care of the authors for five years with the signs of a spastic paraplegia of moderate intensity. In repose the muscles were rigid, with almost complete retention of muscular force, except for slight paresis of the right leg. Sensibility was intact, there was no muscular atrophy, nor were fibrillary contractures present. The electrical reactions were normal. The knee-jerks were increased, and double ankle-clonus was present. The gait was typical. No Romberg's sign. The sphincters only slightly affected.

The patient finally succumbed to pneumonia twenty years from the onset of the nervous symptoms.

At the autopsy no gross lesions were to be made out. The motor cortex, the two internal capsules, the peduncles, the bulb, and the cord were all examined, the only lesions present being in the cord. The lesions consisted of a well-marked sclerosis of the lateral columns and a slight area of sclerosis in the centre of the column of Goll. The lateral sclerosis was most marked in the dorsal region. From the absence of lesion in the other parts examined the authors regard the case one of primary sclerosis of the lateral

columns; they mention a similar case reported by Strümpell, but state that in it the involvement of the columns of Goll was not observed, and that the disease of the lateral columns was not so extensive as in their case.—*Comptes Rendus Société de Biologie*, December 6, 1895.

Pneumo-paludism of the Apices.

In a recent article de Brun has described a pulmonary affection occurring in connection with malaria and involving the apices of the lungs, to which he has given the above name.

The affection he describes may be present in two forms: an acute or a chronic, both occurring in connection with the more chronic forms of malaria associated with cachexia and marked visceral changes.

The disease is rather more common in females than in males, and occurs in young people, nearly all the cases occurring between five and thirty years of age.

Symptoms pointing directly to the lungs may be entirely absent or may be marked. When present they are cough and expectoration. The cough may be insignificant, or may be violent, incessant, and fatiguing, keeping the patient awake at night; it is nearly always dry. When expectoration is present it is slight and mucoid in character, looking much like saliva.

The two forms present the same symptoms and physical signs. The physical signs consist of an increase of vocal fremitis, slight dulness on percussion over the affected area, and marked tubular breathing often with bronchophony. The most striking physical sign is the entire absence of râles.

In two cases of the acute form coming to autopsy under de Brun's care no pulmonary lesions whatever could be made out. The chronic cases showed either cornification or sclerosis.

Tubercle-bacilli were never found in the sputum in any case, and marked malarial symptoms were always present, with pigment in the blood during the paroxysms.

The prognosis of the affection is good. The acute cases clear up rapidly under quinine, though the chronic cases take more time and are some of them incurable.—*Revue de Médecine*, May and November, 1895.

Pylephlebitis and Abscess of the Liver following Typhoid.

Lannois has recently described pylephlebitis and abscess of the liver following typhoid, in which the bacillus of Eberth was present in the pus from the abscess, though not in pure culture.

He states that liver-abscess following typhoid is very rare, occurring, according to Schultz, of Hamburg, once in thirty-six thousand and eighty cases.

Lannois divides abscess of the liver following typhoid into three classes:

a. Metastatic abscesses having an external suppurative focus as a point of origin.

b. Abscesses from typhoid ulceration ot the biliary passages.

c. Abscesses due to pylephlebitis.

He places his case in the last class.

The case occurred in a man of twenty-eight years of age, and came on at

the end of the attack, the patient having been afebrile for three days. At the end of this time he was taken with a violent chill with fever, and the signs of pleural involvement at both bases. This was followed by swelling of the abdomen and great pain in the right hypochondrium. There were no positive physical signs in the abdomen, and the case was regarded as one of tubercular peritonitis on account of the pleural involvement and the swelling of the abdomen.

The patient died three days after admission, the autopsy showing healed ulcers in the ileum, and also partly healed ones, both in this part of the intestine and in the appendix. The vena portæ, the inferior mesenteric vein, and the splenic vein all contained adherent ante-mortem clots. In the liver a number of abscesses were found containing creamy yellowish pus. A number of organisms were present in the pus, and one was isolated which resembled the typhoid bacillus in every way, except that it slightly liquefied gelatin. The author ascribes the liquefaction to impure culture, and states that this is the only case recorded where a satisfactory bacteriological examination has been made.—*Revue de Médecine*, November, 1895.

Hypothermy.

Iscovesco relates an interesting case of hypothermy in a case of general paresis.

The patient was a paretic of four years' standing, the disease being in the demential stage. Following a period of excitement the patient passed into one of depression, with great lowering of the body-temperature. The temperature in the evening of the day on which the depressed attack began was 30° C. (86° F.), and by the next evening had fallen to 28° C. (83° F.). The following day the patient died. Besides the usual lesions of general paresis the autopsy showed a marked arborization of the protuberential vessels and a dilatation of the basilar artery.—*Comptes Rendus Société de Biologie*, November 29, 1895.

Ulcerative Endocarditis due to the Gonococcus.

In a recent number of the *Archives de Médecine Expérimentale*, Thayer and Blumer report an interesting case of gonorrhœal septicæmia with endocarditis due to the gonococcus.

After speaking of the unsatisfactory evidence in many of the reported cases that the organism present was the gonococcus, the authors give the history of their case:

The patient was a female, thirty-four years of age, who entered the Johns Hopkins Hospital complaining of cough, feebleness, and general pains. The family history was negative, but she gave a previous history of two miscarriages. The present illness dated from an attack of rheumatism, which occurred three months previous to admission; in this attack most of the joints were affected, the pain being acute and passing rapidly from one joint to another; it was accompanied by very little swelling. The day previous to admission the patient had a severe chill.

On admission examination showed a slight enlargement of the heart, with a presystolic thrill at the apex; in the same region two murmurs were to be

heard, a light sharply localized presystolic murmur and a soft systolic transmitted to the axilla and the base; the second pulmonic sound was accentuated. No malarial organisms were found in the blood. From the time of her entrance to that of her death, nineteen days later, the patient gradually emaciated; during this whole time she had daily exacerbations of temperature at very irregular intervals, and often accompanied by severe rigors.

Both the heart-murmurs had increased in intensity before death. The patient became very anæmic, the red corpuscles at the time of death numbering only a few over a million. The spleen was palpable from the first.

The autopsy, made two hours and a half after death, showed an acute ulcerative endocarditis of the mitral valve, subacute spleen-tumor, and infarcts in the lungs and spleen.

Microscopical examination showed the presence of gonococci in the valvular vegetations.

Cultures made from the blood during life on a mixture of blood and agar resulted in the growth of an organism morphologically resembling the gonococcus, decolorizing by Gram's method, and refusing to grow on ordinary media.

Cover-slips made at the autopsy from the vagina, uterus, and vegetations on the mitral valves showed a similar organism, which likewise failed to grow on ordinary media, and which decolorized by Gram's method. A mouse inoculated at the root of the tail with a portion of the valvular vegetations did not react.

The authors conclude that they are justified in believing that the organism isolated from the blood during life, and found on the valvular vegetations at autopsy, was the gonococcus, for the following reasons:

a. Its form and disposition were characteristic.

b. Though often free, the organism was often found within the protoplasm of the leucocytes in the valvular thrombus.

c. The organism did not develop on ordinary media.

d. It easily grew on a mixture of human blood and agar (one-third blood).

e. It decolorized by Gram's method.—*Archives de Médecine Expérimentale*, November, 1895.

Typhoid Fever.

Stern (*Volkmann's Sammlung klinischer Vorträge*, No. 138) has published another suggestive paper on typhoid fever. In the first place, he considers the alleged protective action of the gastric juice, and shows by various experiments that the protection the stomach may offer against the entrance of typhoid bacilli must be very uncertain. "Only in cases of hypersecretion with hyperacidity, in which there are large quantities of free hydrochloric acid in the stomach, can we hope that all infectious organisms introduced will be rapidly destroyed." Under normal conditions organisms less resistant to hydrochloric acid than typhoid bacilli can pass the stomach and be cultivated from the feces.

The question as to the presence of typhoid bacilli in the blood was tested in six cases, with positive results in three; twice in blood from roseolæ and once in blood from a vein. In the negative cases the blood was examined only once in two of the three cases. In the third case, confirmed by autopsy,

three examinations were negative. In the cases with positive results the number of colonies was always small, as has been found by other investigators. The bacilli were found between the ninth and twenty-fifth days of the disease. The question whether the blood from the spots or that from the veins is most favorable requires further investigation.

With regard to the blood-serum, Stein found no reason to think that acquired immunity depends on it. The bactericidal action of the serum of patients after typhoid fever was found to be less than that of persons who had never had the disease. The author thinks immunity in such cases depends rather on a change in the body-cells or their functions. Nevertheless, the serum of persons who have just recovered from typhoid fever has a protective action, but this varies so much in different cases that experiments on men should only be made with such serums as, according to experiments on animals, have an especially potent action. At present, the serum of inoculated animals is more promising than that of convalescent men.

Experiments with the effect of high temperature on cultures of typhoid bacilli showed that even high febrile temperature had no marked inhibitory action.

Finally, the question of intestinal antisepsis was carefully investigated, and the conclusion reached that the best and safest methods of rendering harmless infectious germs in the intestines is by mechanical removal, either by cathartics or by high enemata.

Renal Calculus following Cholera Morbus.

Eichhorst reports an interesting case (*Deutsche med. Wochenschrift*, 1896, No. 48) which appears to be unique.

The patient was his son, a lad of ten years, who acquired severe cholera morbus at a summer-resort. During the early days of the attack the urine showed no change. On the fourth day, while the stools were still frequent and bloody, and the urine was passed with the stools, the patient felt a burning pain at the end of urination. Later, the pain was felt in the glans, behind the symphysis, and in the left renal region. The pain became more severe, with strangury. On the following day the urine was dirty brown in color, and contained a large number of small, round, or lenticular, reddish-yellow calculi from the size of a poppy-seed to that of half a pea. The calculi were mostly hard. The urine also contained blood-clots. Microscopically, in addition to blood-cells, large numbers of uric-acid crystals were present, especially of the form claimed by Ultzmann as characteristic associates of urinary calculi. The condition lasted for two days longer, with treatment by milk-diet and Fachingen water, and then complete and permanent recovery followed.

That disturbances of the stomach and bowels, especially in children, often lead to excretion of uric-acid crystals is well known, but the occurrence of actual calculi under such circumstances seems hitherto undescribed. The author recalls the cases, one of which is cited in his text-book, in which a small quantity of white wine caused renal calculi. He now gives the history of a second case of the kind in a man of fifty years. As in the former, red wine never had the same consequences.

The Occurrence of Casts in the Urine without Albumin.

Kossler (*Berliner klin. Wochenschrift*, 1895, No. 14) has investigated this subject and has been able to examine in all twenty-nine cases, most of them in patients with infectious diseases or intoxications. There were eighteen cases of chronic pulmonary tuberculosis, and in these there were not only hyaline and granular, but also epithelial, leucocytes, waxy, and even blood-casts. In most of the cases the urine contained nucleo-albumin in various quantities. Anatomically, the idea that the nucleo-albuminuria and casts are due to renal alterations was borne out by examination in twelve of the cases of tuberculosis Marked inflammatory changes were not to be found, neither was there infiltration around nor exudate in the glomeruli. On the other hand, the tubular epithelium showed granular and cloudy change and degeneration in various stages up to complete necrosis. The changes were not uniform, however, but in scattered foci in the kidneys.

Hemorrhagic Diathesis in the Newborn.

Finkelstein (*Berliner klin. Wochenschrift*, 1895, No. 23) reports the case of a newborn infant dying of the hemorrhagic diathesis. In the organs a specific bacillus was found, cultures of which caused a typical hemorrhagic diathesis when injected into rabbits. The organism resembled the one found by Kolb in three cases of purpura hemorrhagica, and called by the latter b. hemorrhagicus. In Finkelstein's case the mother was syphilitic, but the author looks on the specific disease not as the direct cause of the hemorrhagic diathesis, but only predisposing to the latter process, in which pyæmic or septic infections bring about the characteristic changes.

The Diagnostic Value of the Counting of Leucocytes in Urine.

Reinecke (*Berliner klin. Wochenschrift*, 1896, No. 49) has made some investigations in this subject with the result of adding greatly to the knowledge already available regarding it. An interesting feature of theoretical importance was the confirmation of Hottinger's discovery that leucocytes in pyuria often exceed in the course of a day the total number of leucocytes in the blood, thus casting doubt on the idea that pus-corpuscles are all derived from the leucocytes of the blood. The practical results of the investigation are stated in the following conclusions: 1. Counting the pus-cells in urine frequently, but not invariably, gives an exact measure of the excretion of pus. 2. Continued daily estimations give a picture of the clinical course, enable us to control the treatment, and give an interesting idea of the enormous number of cells lost by the body in severe pyuria. 3. In connection with albumin-estimations the quantitative estimations of pus may in some cases assist in determining whether a pyuria is complicated by nephritis.

Tubercular Endocarditis.

Leyden, in a recent paper before the Berlin Verein für innere Medicin (*Berliner klin. Wochenschrift*, 1896, No. 49), spoke at length on the connection of disease of the heart and tuberculosis. Besides giving a review of the his-

torical aspect of the subject he mentioned some recent observations made in his clinic. In four cases of recent warty endocarditis tubercle-bacilli were found in the lesions. One of the patients, a woman, admitted with advanced tuberculosis, had a history of rheumatism. There was a systolic murmur. From the progress of the case a fresh endocarditis was diagnosticated. An autopsy confirmed the diagnosis. Tubercle-bacilli were present not only in the vegetations, but also in ante-mortem thrombi. An interesting feature was that the bacilli were largely in the cells. Leyden thinks that the bacilli do not enter the cells in the vegetations, but are transported by the cells, so that the latter, so far from protecting the body against infection, favor the spread of the bacilli.

The Relative Frequency of the Symptoms of Tabes Dorsalis.

Leimbach has tabulated the histories of 400 cases of tabes in Erb's clinic, with the following results: Tabes began with lancinating pains in 67 per cent. of cases; bladder-symptoms in 22 per cent.; disturbances of the sexual functions in 15 per cent. On the whole, the knee-jerk was absent in 92 per cent. of cases; lancinating pains present in 88 per cent.; pupil-symptoms in 70 per cent.; impotence in 58 per cent.; "girdle" sensation in 31 per cent.; optic atrophy in 6.7 per cent.; and crises in only 5 per cent. (*Deutsche Zeitschrift für Nervenheilkunde*, Band vii. Heft 5 und 6).

On Urobilin.

Jolles thus sums up the results of his studies on urobilin (*Centralblatt für innere Med.*, 1895, No. 48):

1. The normal coloring-matter of urine is most probably identical with the most advanced product of oxidation of bilirubin; other coloring-matters occasionally occur in urine which differ from the normal only in the amount of oxygen they contain.

2. The coloring-matter known as urobilin (hydrobilirubin) can be separated into two kinds: physiological and pathological. The imperfectly oxidized coloring-matters belong to the physiological urobilins.

3. With the latter should be classed the substances which cause normally colored urine to become darker on standing.

4. The two varieties can be distinguished by the fact that physiological urobilins do not produce fluorescence after oxidation with alcoholic iodine-solution or nitric acid, nor give a characteristic spectrum after complete oxidation, as do the pathological varieties.

5. In order to avoid confusion it is necessary to isolate the urobilins and then to examine them.

6. The sources of pathological urobilin are coloring-matters of bile and blood.

Tropical Multiple Neuritis.

Glogner claims (*Virchow's Archiv*, Band 141, Heft 3) that two classes of beri-beri can be distinguished, viz., those with enlarged spleen, frequent or intermittent pulse, and atypical fever, or rarely with splenic enlargement and

slight fever without frequent pulse, and those in which all these symptoms are absent. Some of the cases are due to malaria, others not. In the latter the blood from the fingers shows no parasites. The blood from the spleen, however, contains pigmented bodies somewhat resembling those of malaria.

They differ from the latter in containing pigment at an earlier period, in a greater amount of pigment, which is arranged in a circular form, and in being extraglobular. The parasites were present in a majority of cases; where they are absent Glogner thinks the neuritis is the sequel of an infection. The pigmented parasites are not always associated with neuritis, but sometimes occur with irregular fever and enlarged spleen.

Lumbar Puncture.

In an interesting article on the above subject, Jacoby reports two cases of spinal hemorrhage in which this procedure was made use of with beneficial results.

Both cases followed direct injury from falls, the symptoms being a more or less complete numbness of the lower extremities, with loss of control over the sphincters and anæsthesia below the point of injury. The numbness of the limbs followed shooting-pains in the back in both cases. The objective signs were bruising of the integument over the injured area, without signs of fracture or dislocation, and the numbness and loss of power above mentioned. The diagnosis was made in each case of intrameningeal spinal hemorrhage with compression of the cord.

In one instance fifteen and in the other twenty cubic centimetres of blood were drawn by lumbar puncture, confirming the diagnosis. One patient who had had marked pressure-symptoms very quickly showed improvement following the procedure, but a certain amount of weakness of the lower limbs remained permanently.

In the second case the recovery was slower, but more complete. Jacoby does not insist on the curative agency of the lumbar puncture, but holds that at any rate it must reduce the local pressure, and leave less blood in the spinal canal to be absorbed. Of the diagnostic value of the procedure in similar cases there is no doubt.—*New York Medical Journal*, January 4, 1896.

Hæmatogenous Jaundice.

In a recent and interesting paper Auld discusses the possibility of a true hæmatogenous jaundice, a possibility which he states has been doubted in the last few years.

After tracing the gradual development and overthrow of various theories relating to the subject, he refers to the experiments made by himself.

The experiments were made upon rabbits which were poisoned by phenylhydrazin, either alone or in combination with metaphenylendiamin. These poisons caused Gmelin's reaction for bile to present itself in the urine for a few days, and in some cases actual jaundice was to be made out in the animal experimented upon.

The histological appearances varied according to the intensity of the poisoning. In acute poisoning there was much pigment in the liver-cells,

and tremendous pigment-formation in the spleen, with extensive destruction of red blood-corpuscles by the spleen-cells.

In the chronic form of poisoning the same tremendous formation of pigment in the spleen with blood-destruction was observed; in the liver the portal veins and capillaries were stained with pigment, but the liver-cells, which were in a state of fatty degeneration, were practically free from pigment. In the kidney, in this form of poisoning, the pigment was found in the renal veins and among the cells of the convoluted tubules, whilst the lumina of the straight tubes in the pyramid was often chockful of it. There was no blood-destruction in the general circulation.

From these findings the author concludes that in these cases we are dealing with a blood-destruction taking place in the spleen with elimination of the products of destruction by the liver.

A true hæmatogenous jaundice can be produced when two conditions are present: 1. The extensive blood-destruction. 2. The failure of the liver-cells to deal adequately with the destruction-products, in which case they are absorbed into the blood.

This latter condition is proved to be possible by the results of the chronic cases of phenylhydrazin- and metaphenylendiamin-poisoning, where the liver-cells had undergone degeneration and were not taking care of the pigment, and where actual jaundice was observed to occur.—*British Medical Journal*, January 18, 1896.

Somnolence and Narcolepsy of Hepatic Origin.

Levi, in speaking of the nervous symptoms of hepatic disorders, says that in order that the existence of these may be admitted there must be indisputable hepatic lesions with the exclusion of lesions in other organs, particularly the kidneys, and that no infectious or toxic condition must be present which could explain the symptoms. It is also necessary to eliminate the nervous symptoms of grave icterus, of which the purely hepatic origin is doubtful, of puerperal eclampsia, and of delirium tremens, in which latter, however, the liver no doubt plays some part.

Levi reports two cases, in one of which somnolence was constantly present during the early stages of a cirrhosis, and in the other intermittent narcolepsy occurred in relation to cholelithiasis.

In the first case the patient was taken with attacks of sleepiness in an early stage of the cirrhosis, he would sleep all day on holidays, only waking up for his meals, and had difficulty in keeping awake at his work, sometimes even going to sleep over it. After death, which was due to severe hepatic symptoms, a well-marked cirrhosis was found, and no appreciable lesions were made out in the other organs.

The second case occurred in an individual with attacks of hepatic colic, during which she was seized with intense drowsiness, and usually slept soundly; between attacks she was perfectly wakeful, the drowsiness coming on again with the onset of the pains.

Levi states that the significance of the somnolence varies, at times being totally unaccompanied by grave symptoms, at times appearing as a precursor of symptoms of the greatest gravity.—*Archives Générales de Médecine*, January, 1896.

The Different Varieties of Gall-stones.

Hanot and Letienne publish an interesting note based on their extensive researches on biliary calculus.

They divide calculi into those of microbic and non-microbic origin. The fresh microbic calculi they describe as of irregular form, vaguely round, raspberry-like, and apparently constituted of numerous small elementary concretions, many of which are to be seen free in the bile. These stones are not faceted, and resemble, as far as form is concerned, dried breadcrumbs. Their crystalline arrangement is not regular, and they are not laminated. They are relatively soft in consistency, and crumble when pressure is applied, and may or may not have a central nucleus. Their color is generally pale. The old concretions of microbic origin correspond to the ordinary description of biliary calculi, occurring either as the solitary, ovoid, laminated stone, or the multiple faceted stones, also having a laminated structure and usually a central nucleus.

The calculi not demonstrated as of microbic origin were only observed in cases where there was complete obstruction of the main ducts due to pressure from without, and not to stone.

These calculi are remarkable for their irregularity of form; they are amorphous, and show numerous indentations on their surface, containing yellow bile-pigment, and contrasting strongly with the almost black color of the stone itself; they are very hard, and not faceted. The authors state that the organism almost invariably connected with the stones of microbic origin, and found also in the bile in these cases, was the bacillus coli communis. —*Comptes Rendus de la Société de Biologie*, December 27, 1895.

Hæmatemesis of Infectious Origin.

In a recent article Rondot reports two interesting cases of hæmatemesis associated with inflammatory disease of the bile-passages.

Both cases occurred in middle-aged individuals with the history, and in one case the physical signs, of gastric ulcer, and both had had abundant hæmatemesis, which came on shortly after the appearance of signs indicating an acute infection, viz., fever, enlarged spleen, and a heart-murmur. No history of hepatic disease could be elicited in either case, nor were physical signs present suggesting such disease. Jaundice was absent in both cases. Both cases died with all the signs of an acute infection. The autopsy in each case showed inflammation of the biliary passages: in one case a general angeiocholitis, in the other a cholecystitis. Besides these findings general infection was evidenced in each case by the enlarged soft spleen and the presence of a fresh vegetative endocarditis, accompanied in one case by pneumonia.

No ulcer of the stomach or duodenum was present in either case, nor was there varicosity of the veins of the œsophagus or erosion of its mucous membrane.

The author regards the hæmatemesis as being of infectious origin, and due to the action of the bacterial poisons upon the vaso-dilator fibres of the depressor nerve of Cyon and Ludwig, and concludes that these cases are the

certain proof that gastro-intestinal hemorrhages of infectious origin can occur as a consequence of inflammatory conditions of the biliary passages.—*Archives Cliniques de Bordeaux*, December, 1895.

SURGERY.

UNDER THE CHARGE OF

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A New Operation for Nephropexy.

VULLIET (*Rev. Méd. de la Suisse Romande*, 1895, No. 6) describes the following operation, which, after a series of experiments on large dogs, he performed successfully with the assistance of his collaborator, POULLET.

The principle involved in the operation is the fixation of the kidney by means of a tendon, which has for its point of attachment the spinous process of the first lumbar vertebra. His experiments and specimens demonstrate that a tendon is capable of living if its original attachment is left intact. The operation consists of four stages. The first is the ordinary lumbar incision exposing the kidney. The wound is tamponed during the second stage. The patient is then placed in a convenient position and an incision made, three-quarters of an inch from the dorsal spines and parallel to them on the same side as the previous incision, and three inches in length, the middle of the incision corresponding to the spine of the first lumbar vertebra. After the skin has been incised the deep fascia is carefully divided upon a grooved director. The tenacious fascia by which the spinalis dorsi is attached to the vertebral spines is exposed, the one which is inserted into the first lumbar vertebra is raised upon a grooved director until two fingers can be inserted beneath it and gentle traction made until it is torn away from its muscular attachment above; it then measures eight to nine and one-half inches in length. The few muscular fibres that remain attached to it are removed and the operation proceeded with as rapidly as possible.

In the third stage of the operation the lumbar incision is opened, and by means of bimanual palpation the space between the twelfth dorsal and first lumbar lateral spines mapped out. The muscular layer intervening is then pierced by a stylet from within outward, the tendon threaded into it and drawn through the intervening tissues into the perirenal space.

The fourth stage is then completed by the drawing up of the kidney into

the wound as far as possible, and the passage of the tendon as a seton beneath the capsule of the kidney on the posterior surface near to its external border from the juncture of its third and lower fourths upward to the juncture of its upper and second fourths. For this purpose they employed a small spatula a little wider than the tendon and provided with an eye, to which the tendon was attached by a suture. After its passage, the tendon still protruded slightly, the kidney was returned, and the suture passed outward through the muscular parietes and fastened by silver-wire sutures in the wound, the ends of the suture afterward being carried to the edge of the wound. A second silver suture was placed beneath the other end of the tendon in order to control it later.

The healing was apyretic. During the first twenty-four hours there was some nausea, due to the chloroform, with vomiting once or twice, during which the patient felt the pain in the lumbar region. She, however, felt no pain in the back where the tendon had been torn away, and even on pressure did not realize that anything had occurred there. There was no collection either sanguineous or serous at that point.

The sutures were removed on the eighth day, when primary union was complete; the patient sat up from that time on. The seventeenth day after operation the patient got up and walked, sitting up for several hours; she made her bed and cared for herself without experiencing fatigue or pain. There was an apparent displacement of the kidney, due to the swelling about the part, but a later examination showed the position to be perfect, and it was impossible to move the kidney, an essential factor. The patient was seen and examined twenty-four days after operation, when it was found impossible to grasp the kidney and draw it down.

The operation produces a large traumatism, but not a serious one, as it lies entirely external to the peritoneum.

Fat-embolism.

Dr. Groubé (*Rev. de Chir.*, July, 1895) reports a case of death from fat-emboli following a serious accident. The review of the literature on this subject, and the observations made in the case reported, led the author to the following conclusions:

1. Although cerebral fat-emboli are very rare, the danger and possibility of their occurrence should not be lost sight of in cases where there are large lesions of the skeleton and soft parts.

2. In all cases of severe contusion and fracture the author advises the examination of the urine for fat; these examinations should be made every day for three weeks.

3. The quantitative estimate of the amount of fat in the urine permits one to judge of the amount of free fat circulating in the blood. It is probable that these amounts are in inverse ratio, the more that is excreted the less remains in the system. The diminution of the amount of fat in the urine and an increased difficulty in respiration are indications of approaching danger.

4. The author calls particular attention to the difficulty of respiration

shown by these patients and their lowered temperature. These signs should put one on his guard.

5. The literature of the subject and the mode of origin of these emboli indicate complete rest as the treatment for the fractured limb. The general rules for the treatment of fractures—*i. e.*, complete immobilization of the fragments—is applicable to these cases; and where in compound fractures it is necessary to reapply the dressings, it should only be done as frequently as is absolutely necessary.

6. Massage should not be employed, as it tends to drive the fat into the tissues. In the case of contusions of the soft parts massage should be applied only at a late stage when the extravasated blood will not disappear.

7. Frequently contusions produce vast cavities filled with blood and liquid fat. In these cases, to prevent this complication, the author advises that these sacs be incised and evacuated, which also hastens the recovery. This evacuation renders the formation of emboli difficult, as it relieves the internal tension. This relief of tension should be also afforded after the resection of a joint.

8. In refraining from amputation the danger of fat-emboli should be considered.

9. As soon as emboli form all assistance that is possible should be given to the kidneys to aid them in the elimination of the fat, and to assist the heart in its action in compensating for the condition of the lungs. These results are obtained to a certain extent by the use of cardiac stimulants and diuretics, more especially digitalis.

Floating Bodies in Joints.

In discussing this subject after a report of three interesting cases, Halstead (*Annals of Surgery*, September, 1895) draws the following conclusions:

1. That the etiology of some of these bodies is yet not fully understood; but that the condition described by König under the name of osteochondritis desiccans explains the most of those that are found in otherwise normal joints. This deserves further investigation.

2. That few, if any, are the direct result of violence.

3. That the most pronounced symptom is the sudden onset of severe pain in the joint with locking of the joint, usually in a nearly extended position, this being followed by acute inflammatory processes in the joint involved.

4. That the lengthening of the femur (in movable bodies in knee) may occur as a result of irritation produced by the pressure of these bodies.

5. That the only treatment for this condition is the removal by direct incision, preferably under cocaine-anæsthesia, as soon as the diagnosis is made.

A Criticism of the Cancer-serum of Emmerich and Scholl.

The method of treating cancer reported by these authors is severely criticised by Petersen (*Deutsch. med. Wochens.*, 1895, No. 20), as the authors claimed for their method results which even the meagre number of cases reported did not justify. They made their report before a sufficient time had elapsed to make their observations of any value, and while the results

they had obtained were so deficient that they could scarcely any of them be called cures. The author deplores the rashness with which men of repute rush into print before they have sufficient clinical proof to base their opinions upon, and before sufficient time has elapsed to make their clinical observations of any value.

BURNS (*Ibid.*) reports his observations in six cases in which he tried the erysipelas-serum. He also criticises severely the conclusions of Emmerich and Scholl, and states that in his cases he saw no favorable action upon the tumors, neither retarding of the growth nor decrease in their volume, while he did observe very decided toxic action and increase of temperature after the injections. He believes, however, that these poor results should not militate against the efficacy of the serum-therapy in other diseases or its possibilities.

A Case of Hydatid Cyst of the Liver.

PANTALONI (*Arch. Prov. de Chir.*, June, 1895) reports an interesting case of hydatid cyst of the right lobe of the liver, situated postero-inferiorly. The cyst was incised and partially excised by a median laparotomy, the patient recovering.

The author draws the following conclusions from his observation of this case:

1. In cases of hydatid cyst of the postero-inferior portion of the right lobe of the liver, non-suppurating, a rare form, a successful operation may be performed by a laparotomy through the anterior abdominal wall.

2. The median laparotomy permits not only the easy incision and complete emptying of the cyst, but also the resection of a greater or less portion of the cyst-wall.

3. If the patient is made to sit up in bed at as early a date as possible, in operation by this method, and remain in this position as much of the day as possible, sufficient drainage will be obtained without the necessity of a lumbar incision.

The Action of Ether and Chloroform on the Kidney.

From a critical analytical study of 130 cases of narcosis in which the urine was examined prior to the operation and from three to six days after operation both by chemical analysis and microscopical examination, EISENDRATH (*Deutsch. Zeitschrift für Chir.*, 1895, Band xl. Heft 5 and 6) draws the following conclusions:

1. Albuminuria, which is already present, is increased more frequently by ether than by chloroform.

2. Albuminuria makes its appearance, however, more frequently after chloroform-narcosis than after ether-narcosis—that is, in the proportion of 32 to 25.

3. Their action is equal upon amyloid disease of the kidney.

4. Tube-casts, with and without albumin, are found with equal frequency after chloroform- and ether-narcosis, but disappear more rapidly in the case of ether. This harmful late action of chloroform upon the kidney has been proven to be greater than that of ether by E. Fraenkel.

The author reports in detail an interesting case of death following chloroform-narcosis, in which the pathological lesion was a necrosis of the parenchymatous cells of the kidney.

The Treatment of Wandering Spleen by Splenopexie.

The result of physiological research has led to a clearer knowledge of the function of the spleen, and has shown how important its function is to the well-being of the whole system. Sykoff (*Archiv für klin. Chir.*, 1895, Band li. Heft 3) calls attention to this fact, and shows from experiments which he has performed that the following conclusions may be deduced in favor of splenopexie as opposed to splenectomy:

1. By means of a catgut net the spleen may be fixed firmly and securely to the abdominal parietes.
2. For this purpose it is sufficient to fix only the middle half of the spleen.
3. The spleen is somewhat decreased in size by the contraction of the newly formed scar-tissue.
4. It retains its function.
5. The prime factor in the fixation are the connective-tissue bands, which replace the catgut.
6. Any form of irritation or scarification of the surface of the spleen is unnecessary and harmful, as it produces adhesions to neighboring structures—as the intestines—and the catgut, if not perfectly aseptic, is more liable to produce suppuration.

n regard to the physiological function of the spleen the author's conclusions are as follows:

1. Extirpation of the spleen can be possible without harmful results only exceptionally, and then only when the other blood-making organs are healthy.
2. Instead of splenectomy, in cases of local lesions, resection should be employed.
3. Splenectomy is indicated when the spleen is the seat of a primary tumor, though not in cases of secondary involvement; and finally in cases where the pathological changes are so great that there is no hope of the remaining portion assuming its normal function.
4. The wandering spleen must and can be fixed.
5. The spleen fixed by catgut has its normal function.
6. The fixed spleen decreases in size, which is of value in cases of hypertrophy.
7. When the spleen is prolapsed anteriorly an attempt should be made to replace and fix it.

The Influence of Ether upon the Kidneys.

Weir (*New York Medical Journal*, November 16, 1895) reports an observation on 305 cases in which careful observation was made. Of these, 87 per cent. were normal before and after etherization; 13 per cent. were normal before and abnormal afterward; the albumin and casts, however, disappearing in a few days' time.

In regard to temperature-changes occurring within forty-eight hours after

an etherization, the urine was normal before and after etherization, accompanied by rise of temperature in 86 cases, of which there were: At 100°, 46 cases; 101°, 22 cases; 102°, 15 cases; 103°, 2 cases; 104°, 1 case. And that with urine normal before and afterward abnormal, accompanied by rise of temperature, 12 cases.

The conclusions arrived at, therefore, are as follows:

That etherization in the vast majority of cases in normal kidneys, and even in abnormal kidneys, brings about no detrimental effects; that when any evidences of abnormality present themselves they are transitory in character and not productive of harm; that elevation of temperature, which I had before thought would aggravate the work of the kidney and bring about in conjunction with an ether-narcosis abnormal excretions, does not appear to exercise any positive influence on this point.

A Case of Double Aneurism of the Superficial Femoral Artery.

Souchon (*New York Medical Journal*, November 2, 1895) reports the following interesting case of ligation of the superficial femoral for double aneurism, with recovery of the patient.

The patient was forty-three years of age, and had no history of any predisposing illness or habit. He presented at the opening of the great abductor of the left thigh an aneurism of the size of a cocoanut. Also at the apex of Scarpa's triangle another aneurism the size of a hen's egg. All the signs of aneurism were present; also œdema of the foot and leg and much pain. No other aneurisms were found, and the rest of the body was healthy.

All of the non-operative modes of treatment were thoroughly tried, but the lower tumor grew so rapidly that its rupture was apprehended, and the superficial femoral was ligated in the middle of Scarpa's triangle in spite of a bruised condition of the tissues from previous treatment. A double contiguous kangaroo-ligature was applied without rupturing the internal coat of the vessel. Five days later the dressing was removed, and the upper aneurism was found to be pulsating. The next day there was suppuration, followed three days later by hemorrhage, which necessitated the reopening of the wound and ligation with silk of the proximal end of the artery; the hemorrhage and pulsation of the upper aneurism ceased. The next day the pulsation returned in the upper aneurism; the lower had ceased pulsating for some time and had decreased one-third in volume. There was a second hemorrhage with subsequent ligation of both ends of the artery, when all pulsation stopped and never returned.

One month later the lower aneurism was incised, and soft, black clots removed. Also the removal of a silk knot from the bottom of a fistulous tract at the site of operation. At this point erysipelas was contracted. The patient, however, recovered with a suppurative arthritis of the knee-joint, which healed after incision and drainage. The patient left the hospital cured four months after operation.

The author draws the following conclusions from the case: (1) In cases of large aneurisms that are liable to take on a rapid growth the compress should not be tried, as a rapid increase in the tumor will make it necessary to oper-

ate through bruised tissue. (2) The ligature should be applied as close to the sac as the condition of the artery will allow—that is, if it is not thinned and dilated so as to shut out the collateral branches which caused the return of the pulsations in the upper tumor. (3) Should this fail, extirpation of the sac is the next thing in order, with or without the use of the Esmarch bandage and band. In case of high femoral aneurisms a provisional loop-ligature, after the manner of Rivington and Treves, should be applied to the artery above.

DERMATOLOGY.

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A Pernicious Disease of the Skin not Previously Observed.

Spiegler reports (*Archiv für Dermatologie und Syphilis*, Band xxxiii. Heft 1 u. 2) a fatal case of skin-disease which was unlike any of the known forms. The patient was a well-nourished, powerfully built man, thirty-eight years of age, who had never had any illness except an attack of syphilis eighteen years previously. Suddenly, without any demonstrable prodromes, he became ill with high fever and an erythematous eruption over the general surface. Upon this erythematous eruption, and in places upon the sound skin, serous and hemorrhagic bullæ appeared, the bottoms of which became necrotic. The process continued with high fever, and ended fatally at the end of three weeks. A bacteriological examination of the serous bullæ demonstrated the presence of an abundance of small rods, about one-third μ long. Morphologically this bacterium could not be identified; and inoculations upon rabbits, guinea-pigs, and mice resulted negatively. Efforts to cultivate this bacterium from the blood were not successful.

A Peculiar Affection of the Hand and Arm following Zoster.

At a meeting of the Dermatological Society of London, held October 29, 1895 (*British Journal of Dermatology*, November, 1895), Dr. Cavafy exhibited a man, seventy-eight years of age, who came under observation some four months previously with a dorso-brachial zoster of the left side. The zoster had been of exceptional severity, characteristic groups of vesicles occurring in the left interscapular region, a few over the pectoral muscle, and a large number on the inner side of the arm and forearm, there being groups on the flexor and extensor aspects of the forearm, especially near the wrist, and several large vesicles were present upon the palmar aspect of the hand and

fingers. The skin was much reddened about the vesicles, and the hand, wrist, and lower third of the forearm were much swollen; pain had been severe before the eruption for a day or two, and continued so throughout the attack. The vesicles became purulent, and were very slow in healing, one or two small ulcers being left. The subsidence of the eruption was followed by much desquamation, the skin of the palm being detached in large flakes.

At the time of the presentation of the patient the pain in the shoulder, arm, and forearm was severe. Dull-red maculæ were present at the site of the eruption, and there were two or three small scars on the forearm and near the elbow. The wrist and hand were much swollen and pitted on pressure. The fingers were in a permanent position of hyperextension, the patient being unable to flex them, and any forcible attempt to do so caused great pain. The wrist was also extended and could not be flexed. The movements of the shoulder were very weak and imperfect, but the exhibitor regarded this as due to pain rather than paralysis. Sensation was also much impaired.

The Treatment of Burns of the First and Second Degrees with Ichthyol.

Leistikow, having employed this remedy during the last six years (*Monatshefte für Praktische Dermatologie*, No. 9, Bd. xxi.), regards it as one of the very best at our command. It is especially useful because of the extraordinary manner in which it allays the pain, which is always so prominent a symptom in burns. Under the application of ichthyol slight, superficial burns heal rapidly. In burns of the second degree with the formation of bullæ, even when extensive areas are involved, the remedy acts in the most favorable manner. After the first application the œdema disappears, the hyperæmia diminishes, and the regeneration of the epithelium begins at once. Cornification proceeds more rapidly under the use of this remedy than under any other.

The manner of the application is especially important. The author has employed various forms, but has found especially useful powder, a soft paste, and a salve-mull. The powder-form is chiefly useful in extensive burns of the first degree, and should be plentifully applied. In extensive burns of the second degree the soft paste is preferable; and when the inflammatory symptoms are severe its use may be combined advantageously with that of the powder.

As a powder the author recommends the following: Zinci oxid., 20 parts; magnes. carb., 10 parts; ichthyol, 1 to 2 parts.

As a paste he employs the following: Calcii carbonat., 10 parts; zinci oxid., 5 parts; ol., 10 parts; aq. calcis, 10 parts; ichthyol, 1 to 3 parts.

A Unique Case of Agminate Folliculitis of Parasitic Origin.

Hartzell reports (*Journal of Cutaneous and Genito-urinary Diseases*, November, 1895) an unusual case of folliculitis due to the invasion of the follicles by the trichophyton fungus. The patient was a man, thirty-eight years of age, in the employ of a railroad company as a repairer of signals and

switches. Some five or six weeks before coming under observation he had noticed a few small pustules on the inner side of the left leg just above the internal malleolus. Through the implication of adjacent follicles these rapidly grew into a palm-sized patch, elevated an eighth of an inch above the surrounding healthy parts. Other patches of a similar kind appeared upon various parts of the leg, and these continued to enlarge until they covered at least two-thirds of the surface of the leg. Marked pain attended the eruption, so that the patient was compelled to give up his work for a considerable time, being unable to walk. Microscopical examination of excised portions showed marked inflammatory changes in and about the follicles, and, what was most interesting, an abundance of spores and mycelium, the latter being especially plentiful.

Under the use of a sulphur ointment, one drachm to the ounce, improvement was immediate, and a cure followed within a few weeks.

Acne Scrofulosorum in Infants.

Under this title T. Colcott Fox calls attention (*British Journal of Dermatology*, November, 1895) to a somewhat uncommon eruption occurring in infants, and reports a number of cases. The eruption is an indolent, small, papulo-pustular, or acneiform one, scattered about sparsely, without any attempt at grouping and without marked subjective symptom. The limbs are the parts particularly affected, the external surfaces especially, and it occurs most abundantly upon the lower extremities, the buttocks, and the parts immediately above. The papules are seated about the hair-follicles, and are acuminate in the early stages. A small pustule forms upon the top of the papule, which dries up and often shells out with a central follicular plug, leaving a crater. As they undergo involution the papules become flattened and irregular in outline, like lichen planus, and they leave stains and faint scars.

At first the author was inclined to regard the eruption as of syphilitic nature, but syphilitic treatment was without benefit. At present he looks upon it as scrofulous, and administers cod-liver oil and iron. Under this treatment the eruption disappears.

The Treatment of Sycosis.

In a communication made to the Société Medico-Chirurgicale de Saint Petersbourg (quoted in the *Journal des Maladies Cutanées et Syphilitique*, 1895, No. 8) M. Tilé recommends a mode of treatment for sycosis which he found efficacious in his own case after the ordinary methods had failed. Contrary to the generally received opinion, M. Tilé does not believe that shaving or epilation is necessary, but that, apart from the pain caused by these operations, they cause inflammation of the hair-follicles and inoculate sound parts. Keeping the hair cut short, so that applications may be readily made, is all that is needed. As a local application a 1 per cent. solution of corrosive sublimate in 95 per cent. alcohol is the most useful. First the sound parts are bathed with this solution, then the diseased parts, and finally both sound and diseased areas. This is practised, at first, two or three times a day, then once a day, and after a time every second day. At night, to

allay the irritation which the applications produce, Hebra's ointment is applied. With this treatment a cure may be obtained in a few weeks to two months. Treatment, however, should not be suspended until a month and a half have elapsed without relapse.

Folliculitis (Sycosis) Nuchæ Sclerotisans.

Under this title Ehrmann reports (*Archiv für Dermatologie und Syphilis*, Band xxxii. Heft 3) two cases of a peculiar affection of the nape of the neck which, while resembling the dermatitis papillaris capillitii of Kaposi, yet differs from this affection in a number of its features. In the first case reported the disease began with a furuncle on the nucha; soon after the healing of this numerous suppurating points appeared over the entire nape, which in the course of a few years led to the formation of a painful swelling of the entire nucha. At the time of coming under Ehrmann's observation the nape of the neck from the posterior border of one sterno-cleido-mastoideus to the other was dark-red, swollen, the epidermis in consequence of the tension to which it was subjected, was shining, and the resistance of the part was such as to recall a cancer *en cuirasse*. The upper margin of the patch was marked by an indented line, which ran from one mastoid process to the other, and which separated the sound from the normal parts pretty sharply, the area of disease being slightly elevated above the surrounding healthy parts. A number of suppurating points were scattered about over this patch, from which slight pressure caused drops of pus to exude. Upon attentive examination it was seen that these drops of pus proceeded from preformed openings, out of which firmly fixed tufts of hair projected. A fine sound could be passed into these openings to a depth of one to one and a half cm. Further examination showed that the hair-pockets of each bundle of hair opened into a common canal through which the hairs passed to the exterior. Upon inspection of the normal scalp it was learned that the greater portion of the hair was arranged in groups, each one of which came out of a common infundibulum. A cure was obtained in this case by the electrolytic destruction of the diseased hair-follicles. In the second case the disease covered a much smaller area, and was situated just beneath the right mastoid process; its clinical features were, however, similar to the first one, and there was the same tufted arrangement of the hair.

The bacteriological examination of the pus showed the presence of staphylococcus pyogenes albus and aureus. The microscopical examination showed that the hair-infundibulum led to a wide tubular cavity lined with epidermis, into which several hair-follicles opened in such a manner that one or two of them might be regarded as a continuation of the cavity, while the others converged from the sides toward its axis, an arrangement known to exist normally in certain animals.

The author would define these cases as a folliculitis (of the hair-follicles) or a sycosis produced by staphylococci, which led to a deeply penetrating sclerosing inflammation of the skin of the nucha, because the hair-follicles, on account of their anatomical arrangement, led deeply into the subcutaneous connective tissue.

OBSTETRICS.

UNDER THE CHARGE OF

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Rupture of the Uterus. Recovery.

In the *Centralblatt für Gynäkologie*, 1895, No. 51, Queisner reports the case of a multipara, aged thirty-eight years, to whom he was called by a midwife because labor-pains had suddenly ceased. The patient had complained of severe pain in the abdomen, and had become unconscious. Upon examination the head of the child was found at the brim of the pelvis, and the breech upon the left side and above. The cervix was found fully dilated, and upon the left side of the fundus a rent in the uterus was discovered between 10 and 12 cm. long. The right leg of the child protruded through this rent, and had emerged into the peritoneal cavity through a tear in the peritoneal coat of the uterus 5 cm. long. The cord had ceased to beat. By careful manipulation the right foot was brought back into the uterine cavity. Version was easily made, and the placenta, which was situated upon the anterior wall of the uterus, was readily detached. After emptying the uterus its left half contracted well, although the right portion of the womb was not firmly contracted. The pulse could be felt at the wrist after several injections of ether. There was very little hemorrhage, and hence the uterus was not tamponed. A five-pound bag of sand was laid upon the abdomen over the womb, and fastened with a bandage. Opium was given freely. The patient recovered without fever, and upon examination at the right side of the uterus there was found a hard and sensitive cicatrix. This scar remained about the same in size, but became in a short time very much less sensitive. The cause of the rupture of the uterus in this case was not clearly ascertained. The patient was an exceedingly poor woman, and had lifted heavy weights during the day upon which she was confined.

A Case of Ectopic and Entopic Pregnancy, with Double Uterus.

In the *Zeitschrift für Geburtshülfe und Gynäkologie*, 1895, Band xxxiii. Heft 3, Walther describes the case of a patient, aged thirty-five years, admitted to the clinic at Giessen complaining of colicky pain in the abdomen, with irregular discharge of blood from the uterus and cessation of menstruation for several weeks. The patient had been married twelve years, and had borne three children. Following a miscarriage at six months, she had one menstrual period, after which her monthly sickness ceased. Since this time she had the subjective signs of pregnancy with irregular bleeding and the discharge of shreds of membrane.

Upon examination the patient was ill-nourished and presented the signs of early pregnancy. Above the symphysis a resisting mass could be felt, which could be shown to be the uterus pregnant at three months. Upon the left side of the median line there was a soft cystic tumor the size of a fist, which gave also resistance upon pressure. In the right vaginal vault pulsation could be felt, while examination with the speculum showed the cervix softened and the tissue colored a bluish-red. Examination under anæsthesia confirmed the diagnosis; the introduction of a sound showed that it passed up upon the left side for a length of 9½ cm. The physical examination of the case pointed to the presence of a tubal pregnancy upon the left side three months advanced, and also pregnancy in the right half of an ill-developed uterus. Following the examination under anæsthesia, the patient was taken with severe pains of colicky nature, with straining in the region of the bowel, her symptoms demanding abdominal section. Upon opening the abdomen a double uterus was found, and in its right portion a pregnancy three months advanced. In the left tube there was a hæmatoma. The left tube was ligated and removed, and the abdomen sponged free from clots. On the third day after the operation the patient was taken with sudden and severe hemorrhage from the uterus, which preceded abortion; this necessitated an examination and the rapid emptying of the uterine cavity. In the right half of the uterus were found the placenta, cord, and membranes, while upon the left side a thick deciduous membrane was present. The patient made a good recovery.

Ventro-suspension of the Uterus. Pregnancy and Transverse Position of the Fœtus.

Miländer (*Zeitschrift für Geburtshülfe und Gynäkologie*, 1895, Band xxxiii. Heft 3) has collected a considerable number of cases in which pregnancy supervened after the operation of ventro-suspension of the uterus. He adds two cases, which are as follows: His first was that of a multipara upon whom suspension of the uterus had been performed to remedy prolapse of the anterior vaginal wall and retroflexion of the uterus. Miländer was called to the patient in labor, finding the fundus of the uterus two fingers' breadth below the umbilicus, while above the symphysis there was a thickened or scar tissue the width of a hand in the linea alba. The abdominal wall was depressed at this place. The child had been expelled, but the placenta was retained, although there was but slight hemorrhage. The placenta was readily removed by friction, and the patient made an uninterrupted recovery.

A second case was that of a multipara upon whom the operation of ventro-suspension had been made because of prolapse of the vagina and uterus. The patient had recovered well from the operation, and was admitted again to the clinic in the pregnant condition. The uterus was found two fingers' breadth above the umbilicus, the head upon the right side of the pelvis, the breech upon the left. The anterior abdominal wall was adherent to the anterior wall of the uterus at the site of the former suture. By palpating the round ligaments, it was possible for the physician to determine that it was not the fundus of the uterus which was found two fingers' breadth above the umbilicus, but that it was the posterior wall of the uterus which was greatly dis-

tended, while the fundus itself was lying two fingers' breadth beneath the umbilicus. The heart-sounds were heard in the median line. The vulva was swollen, while the cervix was drawn strongly backward against the promontory of the sacrum, the external os admitting two fingers. The membranes had ruptured, and the scapula, arm, and a loop of the umbilical cord could be felt. As dilatation was slow and pains were weak, De Ribes's bag was introduced, but was only partially successful. Under narcosis it was possible to dilate the os and to make version and extraction. The child was asphyxiated, but readily revived. There was a tear of the pelvic floor, which was easily united.

Vaginal Cœliotomy for Tubal Pregnancy.

Donald (*British Medical Journal*, 1896, No. 1828) reports the case of a patient married five years who had not been pregnant previously. Her last period was followed by six weeks' cessation of menstruation, and then by two weeks' metrorrhagia, when the patient was admitted to the hospital. Upon examination the uterus was found anteverted and slightly enlarged. On the left side an elongated swelling was felt, freely movable and of doughy consistence. The case was diagnosticated as one of unruptured tubal pregnancy. The patient was kept in bed for eight weeks, during which time but little change occurred. It was determined to remove the tube by vaginal section. A transverse incision was made in front of the cervix, and the bladder separated from the uterus and broad ligaments. The tube was found much distended, but fairly movable. It was incised and a large quantity of fluid blood and a tubal mole were evacuated. The collapsed tube was then ligated and removed. The wound in the vaginal vault was stitched up with catgut, the fundus of the uterus being drawn down and fixed to the vaginal wall. The patient made an uninterrupted recovery.

The Practice of Symphyseotomy at the Baudelocque Clinic of Paris during the Year 1895.

In the *Annales de Gynécologie*, January, 1896, Pinard reports twenty symphyseotomies performed during the year 1895 at the Baudelocque clinic of Paris. Twelve of these were made upon primiparæ and eight upon multiparæ Eighteen of the cases had rhachitic pelves, one had a kypho-scoliotic pelvis, and one had a Naegele's pelvis. Symphyseotomy was performed a second time upon three patients. Fourteen of the cases were delivered with forceps after the pubic joint had been opened; in three cases version was performed because forceps had failed, and in three cases version was selected as a method of delivery. Seventeen of the women recovered and seventeen of the children. Three mothers and three children perished. In reviewing the cases of the three mothers who perished, one died of pneumonia, an examination of the pubes showing that the wound had healed and that the tissues were free from bacteria. In the second case the wound had healed by first intention. In the case of the third woman to die, the membranes had been ruptured twelve hours before, and a greenish liquid had been discharged. The section of the symphysis was readily made, but the extraction of the child was very difficult.

In the four years, 1892-1895 inclusive, 69 cases of contracted pelvis are reported. Symphyseotomy was practised extensively in these cases. Sixty-two of the patients recovered, and 61 of the children survived. In some of these cases the vagina was wounded at the time of delivery, but was immediately closed by suture. In all of them satisfactory union at the symphysis occurred.

The Prevention of Puerperal Septic Infection in Private Practice

Herman (*British Medical Journal*, 1895, No. 1828) considers bichloride of mercury the best antiseptic for obstetric practice. He draws attention to careful cleansing of the hands, sterilization of all instruments by heat and boiling, and the importance of thoroughly clean clothing. Internal examinations should be as infrequent as possible. The external parts should be thoroughly washed. As a lubricant for the finger, bichloride of mercury in glycerin 1 : 2000 is recommended. Healthy women do not require preliminary douches. Immediately after labor the physician should give a douche of bichloride of mercury 1 : 2000. If a hand or instrument has been introduced within the uterus, it should also be cleansed. If labor has been difficult, so that necrosis of the tissues is feared, a douche of bichloride of mercury 1 : 4000 should be continued twice daily. It is important that explicit directions be given to nurses, and this is best accomplished by printed rules giving careful details for their conduct.

Some Unusual Cases of Hydatid Mole.

In the *Practitioner*, 1896, No. 1, Champneys reports the case of a multipara, aged forty years, who, six weeks after the last menstruation, began to have a reddish discharge, followed by pain in the pelvis. The uterus became retroverted, enlarged, and incarcerated in the pelvis. Later a hydatid mole was expelled spontaneously, followed by fever and chill. The uterus was several times scraped with the finger, removing diseased tissue, washed out antiseptically, and an iodoform-suppository inserted. This was but partially successful, the use of the curette finally becoming necessary. The patient went on to recovery, although the uterus was tender for three weeks, and involution was very slow.

His second case was that of a woman, aged thirty-three years, whose menstruation had ceased for some time, and who had headache and a general feeling of drowsiness. This was followed by a slight discharge of pale blood at intervals. She was afterward taken with violent pain in the right side, with bleeding. This continued at intervals for several days, finally ceasing. On admission to the hospital an enlarged uterus and softened cervix were found. The patient was given ether, and an effort made to dilate the cervix with a laminaria-tent. This was but partially successful, and a tampon was also employed. When this gauze was removed, it was found that the patient had expelled a hydatid mole from the uterus. She died nine days after the expulsion of the mole. Post-mortem examination showed death from septic infection. He also reports the case of a girl, aged eighteen years, who had borne a child, and who, becoming again pregnant, suffered from cramp-like

pains in the abdomen, with the discharge of pale-red fluid. On examination the cervix was found high up and far back, the tissues giving the feeling as if a soft fibroid was within the enlarged uterus. Bleeding occurred, and by examination it was possible to secure a small piece of tissue. This was found to be a portion of a hydatid mole. Ergot was given, when the patient expelled two large masses with clots. The uterus was cleansed as well as possible, and douched with an antiseptic fluid. The patient had fever, and it was necessary to cleanse the uterus again with the finger, which removed a portion the size of two duck-eggs. The patient gradually improved, finally making an apparently good recovery. Some time after leaving the hospital the patient was again admitted; the uterus was curetted, the walls being found very thin. Two hours after, the patient had a violent chill, and the intrauterine douche was repeated. The patient became profoundly anæmic, and had an attack of pneumonia at the base of the right lung. It was necessary again to employ the curette, and this was followed by the use of a Keith's drainage-tube. The patient had repeated chills and finally died of septic infection.

Post-mortem appearances were those of *deciduoma malignum*.

Disinfection of the Fingers and of the Hand in Obsetric Work.

In the *Deutsche medicinische Wochenschrift*, 1895, No. 51, Ahlfeld reports interesting experiments upon the best method of cleansing the fingers and the hand before making examinations and performing obstetric operations. He concludes by recommending the following: To prepare the hands for making an examination the nails should be cut short, trimmed and smoothly polished, and scrubbed for three minutes with soap and brush and warm water. The hands should then be rinsed in clean boiled water. The fingers and the rest of the hand should then be carefully rubbed in 96 per cent. alcohol with a piece of flannel. Especial care should be taken that the alcohol gets well under the nails. The fingers are then sterile for purposes of examination only.

Where the hand is to be introduced within the womb in the performance of an obstetric operation the following method of cleansing is advised: The nails to be cleaned, and the hands and arms scrubbed for five minutes with soap and hot water. The hands and arms are to be rubbed with flannel, dipped in 96 per cent. alcohol, for five minutes. The hand is then sufficiently sterile to permit the performance of any obstetric operation or manipulation.

Nephritis in the Newly-born.

In the *New York Medical Journal*, 1896, No. 3, Jacobi describes cases of this disorder in infants, and summarizes his observations as follows: Nephritis is not rare in the newly-born. The use of the centrifuge enables us to recognize cases of nephritis in infants which were formerly considered simple or transient albuminuria. The fragility of the bloodvessels, the small size of the renal capillaries, the inability of the infant's intestine to expel toxic contents, and the large size of the lymphatics and bloodvessels of the intestine all favor the absorption of toxins, resulting in nephritis. The

principal forms of this condition in infants are the congestive, resulting from feeble heart, asphyxia, and exposure; the obstructive, from rapid decomposition of the blood, with the formation of retrograde products; and the irritative, caused by infarctions of uric acid or hæmatoidin, by purpura or intestinal hemorrhage, or the microbes and toxins of enteritis and of infectious maladies.

Tetanus following Abortion Successfully Treated by Antitoxin.

Withington reports in the *Boston Medical and Surgical Journal*, 1896, No. 3, the case of a patient, aged thirty years, who had an abortion, denying positively any interference of a criminal nature with her pregnancy. Two days afterward she was seen by a physician who curetted and douched the patient, and one week later she was able to sit up. She gradually developed stiffness of the neck and lower jaw, with cramps in the legs. Her temperature varied from 100° to 102°. There was no evidence of sepsis about the abdomen or uterus. The patient gradually grew worse, with repeated attacks of spasm, with opisthotonos. Bromide and chloral were used in large quantities with no apparent result. She was able to take considerable quantities of liquid nourishment. Twenty-two cubic cm. of tetanus-antitoxin serum were injected; gradual improvement followed, she having received in all three injections upon successive days, a total quantity of 68 cubic cm. Her gradual recovery followed.

Three Cases of Symphyseotomy.

In the *Archives de Tocologie et de Gynécologie*, 1895, No. 12, Auvard describes three symphyseotomies with their results. The first was the case of a multipara whose first child was lost after version, and who came to her second labor without the entrance of the child into the pelvis. The internal conjugate of the pelvis measured 9½ cm., its lateral dimensions were above the normal. The head presented by the posterior parietal bone, and flexion was absent. After the membranes ruptured, the head presented at the brim of the pelvis, but failed to engage in the pelvis. The forceps was applied, and cautious traction made for eight minutes under chloroform without success. The forceps was allowed to remain in position and symphyseotomy was performed, the joint being opened by a bistoury. The child was readily extracted, and the wound closed with silk. The patient suffered from a mild degree of septic infection, but made a good recovery.

His next patient was a girl, aged twenty years, rhachitic and having a rhachitic pelvis. The head failing to engage, the forceps was applied, followed by symphyseotomy. The child was born asphyxiated, but revived. The patient made a good recovery, and left the hospital shortly before the pubic joint became firmly fixed. She was seen subsequently, examined, and found to be in good health, with a solid symphysis.

His third case was that of a rhachitic primipara, with a much contracted pelvis, with internal conjugate of 7½ cm. Labor was induced, but failed to proceed spontaneously. The forceps was applied without result, and symphyseotomy finally done. The wound healed slowly in this case, and the child died ten days after birth, from inanition.

It will be noticed that Auvard's method of proceeding is different from that of some other operators in that he first applies forceps, and, failing to deliver, performs symphyseotomy without removing the forceps. The advantage of this method is not evident. When the head does not engage after good labor-pains, and when suprapubic pressure has been employed, efforts at delivery by forceps endanger mother and child.

The Treatment of Eclampsia, based upon the Study of One Hundred and Twenty-nine Cases.

In the *Centralblatt für Gynäkologie*, 1895, Nos. 46, 47, and 48, Zweifel reports his very interesting results from his study of 129 cases of eclampsia in his clinic at Leipzig. He analyzes his cases with regard to the number and duration of the paroxysms and the degree of unconsciousness present, with reference also to the period of pregnancy at which the attack occurs, and whether eclampsia develops before labor or at the beginning of or during parturition. He has also investigated the quantity of urine, the quantity of albumin, and whether blood was present in the urine. He further has observed the quality of the pulse, its frequency and increased or diminished tension, and the temperature during the attack and during the puerperal period. He describes his former view as regards treatment, which was that shared by many, namely, that instrumental delivery should be avoided if possible, because, in spite of narcosis, the irritation occasioned by such delivery increased the number of paroxysms. He contrasts his results in former years, when his patients were treated by the expectant method, with those obtained by rapid delivery, and finds that under the former his mortality-rate was 32 per cent., while with more active measures he has reduced the mortality to 15 per cent. He prefers chloroform as an anæsthetic agent in the treatment of these cases.

These results are especially interesting in view of a change in belief which has gradually come about in the minds of many obstetricians. Dührssen's method of incising the neck of the uterus makes delivery possible in those cases where the pelvis is not contracted or the child not excessive in size. It is safe to say that within the past year American obstetricians, seeing the largest number of cases and operating most frequently, have come to share the conclusion expressed by Zweifel.

Ectopic Pregnancy with Delivery of a Living Child at Term.

Reismann reports in the *Centralblatt für Gynäkologie*, 1896, No. 1, the following case from the clinic of Tauffer at Budapest: The patient was pregnant for the fourth time, and had suffered, when three months advanced, from sudden syncope and pain in the abdomen, with the development of a tumor which occasioned difficulty in micturition. She also had fever, for which she entered a hospital and remained eighteen days. She grew so much better that she left as cured, and her pregnancy proceeded in an apparently normal manner. She came into labor under the care of a midwife, who summoned assistance because the fœtus was in transverse presentation. Labor-pains were weak, and with little force. A diagnosis of ectopic gestation was made, and the patient sent to the hospital. On examination the

fœtus could be outlined in the abdomen, and the fœtal heart heard. By vaginal examination the uterus was found drawn upward and pressed upon by a large, solid tumor at the brim of the pelvis. As labor-pains had begun, delay could not be practised, but operation was indicated at once. On opening the abdomen the fœtus was found obliquely, the breech upon the right side, the head upon the left, between the uterus and the spinal column. Its extraction was followed by profuse hemorrhage from the partially separated placenta, which had attached itself to the peritoneum in Douglas's cul-de-sac, and to the tissues over the sacrum. It was at once loosened and removed. The membranes were adherent to the posterior wall of the uterus, and they were also separated and delivered. A portion of the fœtal sac had been composed of the right broad ligament. The vessels of the broad ligament were ligated, the uterus, tubes, and ovaries removed, and Douglas's cul-de-sac thoroughly drained by sterile gauze, which was carried into the vagina. The abdominal incision was tightly closed. It was evident that at the time when the patient suffered from pain and syncope a tubal pregnancy at the right side had burst, leaving the fœtus to develop in the abdomen. The gauze was removed through the vagina on the second day, and the stitches taken out from the abdominal incision on the seventh. The patient's recovery was delayed by thrombosis in the left leg. The child lived and flourished, although the mother was unable to nurse it. Its limbs were in peculiar positions, and on the eighth or ninth day after birth athetosis developed in the right hand, from which the child ultimately recovered. Its spastic contractures gradually disappeared.

GYNECOLOGY.

UNDER THE CHARGE OF

HENRY C. COE, M.D., M.R.C.S.,

OF NEW YORK.

The Condition of the Muscular Tissue of the Uterus in Connection with Disease of the Organ.

Bertelsmann (*Archiv für Gynäkologie*, Band v. Heft 1) finds, as the result of his microscopical studies, that in cases of metritis, carcinoma, and interstitial fibro-myoma of the uterus the muscle undergoes a hyperplasia, the tissue becoming softened and stratified and the cells swollen, much as in the pregnant uterus.

Cardiac Disturbances at the Period of Development in Women.

Kisch (*Berliner klin. Wochenschrift*, 1895, No. 39) notes the following phenomena in connection with the establishment of the menstrual function: 1. Palpitation and tachycardia in individuals otherwise healthy, appearing before the first menstrual discharge and persisting for some time afterward. 2.

Cardiac irregularity in chlorotic females. 3. Hypertrophy of the heart, which develops at the time of maturity, caused by the circulatory disturbance which then occurs, as well as by the rapid growth of girls and improper habits of dress.

Vaginal Extirpation of the Uterus for Bilateral Disease of the Adnexa.

Landau (*Berliner klin. Wochenschrift*, 1895, No. 38) reports 109 cases, with only a single death. In the same connection he refers to 112 cases of vaginal extirpation of the uterus for malignant disease, with 8 deaths, and 56 for uterine fibroid, with 4 deaths, three of the latter not being due to the operation. In the former class all the patients with a single exception remained well after the operation—some for years. Clamps were used in all instances when the uterus was removed. The intestine was injured five times, the bladder once, and the ureter once, but the lesions healed spontaneously or were cured by subsequent operations.

Ferripyrin as a Hæmostatic.

Schaeffer (*Münchener med. Wochenschrift*, 1895, No. 53) calls attention to the great value of this drug as a local hæmostatic in gynecology, used either in the form of powder or in a concentrated watery solution (16 per cent.). Unlike chloride of iron, it is not only astringent without acting as a caustic, but also has a distinct analgesic effect. In a sterilized solution it may be applied directly to oozing surfaces during operation, or may be introduced into the uterine cavity after curettage. A one per cent. solution may be employed for vaginal injection.

In cases of inoperable carcinoma, with profuse hemorrhages and foul discharge, powdered ferripyrin is especially valuable for its local anæsthetic, as well as for its astringent, properties. It is applied directly to the sloughing surface or in gauze bags, mixed with powdered charcoal.

An aqueous solution (1 to 16 per cent.) may be injected into the bladder in cases of hæmaturia, without danger; in fact, it even relieves the accompanying tenesmus.

Alexander's Operation.

Stocker (*Correspondenz-Blatt für Schweizer Aerzte*, 1895, No. 24) reports thirty-seven successful cases, and states as the result of his experience that Alexander's operation is the only one which maintains the uterus in its normal position, and is to be preferred to the treatment of retro-displacement by either pessaries or massage. The latter methods, he believes, are seldom curative, beside being tedious both to the physician and to the patient.

Castration in Osteomalacia.

Neumann (*Ibid.*), from a study of his own cases and those reported by others, arrives at the conclusion that neither the medical nor the surgical treatment of osteomalacia is curative in a considerable proportion of the

number. The improvement noted after the exhibition of certain drugs (notably phosphorus) is not greater than that which follows the careful regulation of the patient's diet and hygiene. This improvement is more striking when phosphorus is administered after previous castration. The operation is indicated in nulliparæ, when the disease is progressing rapidly and resists medical treatment, though it may prove of no avail to arrest it.

Irrigation of the Uterine Cavity.

Roesing (*Archiv für Gynäkologie*, Band xlix. Heft 2) conducted a series of novel experiments with a view to determining the extent to which the uterine cavity is reached by injections. For this purpose he employed freshly extirpated uteri, injecting colored fluids through different varieties of catheters, so that the endometrium would retain the staining.

He found that the freer the outflow the less thorough was the irrigation of the cavity. The larger the amount of fluid which was injected, the more deeply did it penetrate below the surface. Sections of the uteri showed that healthy tissue was more deeply stained than diseased. Medicaments are brought most thoroughly in contact with the endometrium when introduced on applicators, or by means of a Braun's syringe.

Para-metritic and Perimetritic Exudates.

Bushbeck and Ettinger (*Archiv für Gynäkologie*, Band 1, Heft 2) conclude a clinical study of this subject with these practical observations: High fever of a pyæmic type may exist for weeks, yet incision of the primary focus of infection may reveal the presence of serum only; this may contain only leucocytes, or numbers of streptococcus-chains. Exudates of stony hardness may contain small quantities of pus or serum. Until the fluid is evacuated the temperature remains elevated. This fact explains the negative, or even harmful, effects of massage in such cases.

Plastic Operations for Prolapsus Uteri.

Nirbergall (*Ibid.*) gives the results of the surgical treatment of prolapsus at the Basle clinic in 110 cases. The operations usually performed were amputation of the cervix and anterior colporrhaphy according to Fehling's method, followed two weeks later by Hegar's colpo-perineorrhaphy. Fehling denudes two long ovals on either side of the median line of the anterior vaginal wall, and unites their edges with silver-wire. Seventy patients were seen or heard from, and of these fifty-seven were cured at periods varying from one to six years after operation, seven of the women having since borne children. The ultimate results were twenty per cent. better than those obtained by the ordinary operation in the anterior wall.

Mycotic Endometritis.

Colpe (*Centralblatt für Gynäkologie*, 1895, No. 27) reports a case of obstinate cervical endometritis which resisted the usual astringents and caustics. Finally mycotic spores were found in the secretion, when lactic and sali-

cylic acids were used locally on account of their known antibacterial effect, with prompt relief. The writer states that mycosis of the cervical canal is probably a more frequent cause of obstinate catarrh than is generally supposed.

The Endometrium during Menstruation.

Van Meerdervoort (*Inaugural Dis.; Centralblatt für Gynäkologie*, 1895, No. 49), from a study of uteri removed during menstruation, concludes that in consequence of vasomotor dilatation of the pelvic vessels the cervical and corporeal endometrium became intensely congested, resulting in a transudation of blood, as well as in an increased secretion of mucus. When the congestion and resulting serous infiltration are moderate, corresponding to a condition of slight capillary congestion, the menstrual slow is slight, and the reverse. The degree of the congestion depends upon the intensity of the ovarian stimulus.

Vesico-fixation versus Vagino-fixation.

Mackenrodt (*Ibid.*), in consequence of the unfortunate results which have followed pregnancy after vagino-fixation, has been led to abandon the operation, in spite of his having had 90 per cent. of successful cases. The uterus is retained in a position of extreme anteflexion by firm adhesions, which do not yield under the influence of pregnancy. He now opens the anterior vaginal fornix by a vertical or transverse incision, pushes up the bladder, opens the vesico-uterine fold of peritoneum, and after excising as much of this membrane as possible unites the vesical edge to the fundus uteri. The bladder is then reunited to the raw surface in the corpus uteri as low as the os internum, and the vaginal wound is closed. The advantages claimed for this method are fixation of the uterus in a normal position, obliteration of the vesico-uterine pouch, preservation of the normal relations of the bladder, the absence of subsequent vesical and uterine disturbances. The indications for the operation are retroflexion with perfect mobility of the uterus, with or without prolapsus. Ventro-fixation should be preferred if the uterus is adherent.

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CONTENTS.

ORIGINAL COMMUNICATIONS.

PAGE

Pneumococcus-abscess of the Ovary, with Report of Three Cases. By J. H. Etheridge, M D. 377
Diphtheritic Hemiplegia. By John Jenks Thomas, M.A., M.D. 384
A Case of Landry's Paralysis, with Autopsy. By Theodore Diller, M.D., and Adolf Meyer, M.D. 404
Polymyositis Acuta, with Report of a Case Presumably of Syphilitic Origin (Myositis Syphilitica). By James B. Herrick, M.D. 414
The Influence of Alcohol and Alcoholic Drinks upon the Chemical Processes of Digestion. By R. H. Chittenden, Ph.D., and Lafayette B. Mendel, Ph.D. . 431

REVIEWS.

System of Surgery. Edited by Frederic S. Dennis, M.D. 451
The Theory and Practice of Counter-irritation. By H. Cameron Gillies, M.D. . 453
Pregnancy, Labor, and the Puerperal State. By Egbert H. Grandin, M D. . . 454
Manual of Gynecology. By Henry T. Byford, M.D. 457
A Manual of Organic Materia Medica: Being a Guide to Materia Medica of the Vegetable and Animal Kingdoms. By John M. Maisch, Ph.M., Ph.D. . . 459
The Practice of Massage; its Physiological Effects and Therapeutic Uses. By A. Symons Eccles, M.D. Aberd. 460

PROGRESS OF MEDICAL SCIENCE.

THERAPEUTICS.

PAGE

Antitoxin and Spermine . . . 461
Treatment of Gout 461
The Atropine-group 463
External Application of Antipyretics 464
Loretin 464
Inoculation Against Cholera in India 464
Malarial Fevers in Infancy . . 465
Antitoxin 466
Rhus-poisoning 466
Poisoned by Bismuth Subnitrate . 467
Bismuth Naphtholate . . . 467
Antipyrin for Conjunctivitis . . 468
Arecoline Hydrobromate . . . 468
Borax-insufflations in Intestinal Diseases 468
Sulphonal Exanthemata . . . 469
Pharmacological Action of Purgatives 469
Glycerin Suppositories . . . 470
Gastro-intestinal Antisepsis . . 470
Orexine 470

MEDICINE.

A Case of Acromegaly . . . 471
Examination of Fasting Stomach . 471
Perisplenic Blood-cyst . . . 472
The Prognosis in Graves's Disease . 472
Changes in the Brain in Cholera . 472
Malignant Endocarditis following Gonorrhœa 473
Blackwater Fever 473
Metastatic Cancer of Thyroid . . 475
Gastric Crises in Diabetes Mellitus . 476
Tuberculous Ulcer of the Mouth . 476
The Leucocytes in Tuberculosis . 476
Tabes Dorsalis and Syphilis . . 477
Protozoa (Trichomonas) in Sputum . 477
Relation Between Acidity of Gastric Juice and Acidity of Urine . . 478

SURGERY.

	PAGE		PAGE
Radical Cure of Hernia	479	Circumstances under which Chloroform is Preferable to Ether as an Anæsthetic	483
Resection of the Vasa Deferentia	480	The Relation of Trauma to Malignant Tumors	484
Varicocele and its Treatment	480	Influence of Ether or Chloroform on the Kidneys	484
Mammary Tuberculosis	480	Juxta articular Tubercular Foci	485
Transplanting the Ureters into Intestine	481	Treatment of Floating Kidney	485
Intractable Vomiting Cured by Pyloroplasty	481	Peritoneal Tuberculosis	486
Enlarged Prostate after Castration	481	Hypertrophy of the Prostate	487
Suture of Large Venous Trunks	482	Ligature of the Innominate Artery	488
Eighty Cases of Lithotrity	482		
Surgery of the Lung	482		
Penetrating Wounds of Spinal Cord	483		

OBSTETRICS.

Alcohol as a Disinfectant in Obstetrics	489	Abnormal Labor-pains	491
Bullet-wound of the Pregnant Uterus	489	Gonorrhœa during Pregnancy	491
Rupture of Sac and Death of Fœtus in Abdominal Pregnancy	490	Double Ovariotomy during Pregnancy	492
Influence of Toxins upon Fœtal Development	490	Gonorrhœal Rheumatism in Puerperal State	492
		A Successful Symphysiotomy	493

GYNECOLOGY.

Pruritus Vulvæ	493	Intestinal Obstruction after Cœliotomy	494
Gonorrhœal Metritis	493	Vaginal Hysterectomy for Irreducible Inversion	495
Repeated Operations in Adherent Tumors	494	Unique Variety of Ovarian Carcinoma	495
Myoma of Rectum Simulating Ovarian Cyst	494	Early Diagnosis of Cancer of Uterus	495
Perforation of the Uterus	494	Treatment of Large Uterine Fibroids	496
		Drainage of the Peritoneal Cavity	496

PÆDIATRICS.

Treatment of Infectious Vulvo-vaginitis	497	Salpingo-ovaritis following Vulvo-vaginitis in Children	499
Suffocative Laryngitis in Varicella	497	Morphinism in Children	499
Infantile Intussusception	498	Multiple Neuritis in Infants	500

PATHOLOGY AND BACTERIOLOGY.

The Diagnosis of Neoplasms	501	Casts without Albumin	502